THE

Journal of the American Medical Association.

EDITED FOR THE ASSOCIATION BY N. S. DAVIS.

PUBLISHED WEEKLY.

VOL. III. CHICAGO, NOVEMBER 8, 1884. NO. 19.

ORIGINAL ARTICLES.

MALFORMATION OF THE FEMALE SEXUAL ORGANS, RESULTING FROM ARREST OF DEVELOPMENT.

BY B. BERNARD BROWNE, M.D.,

Professor of Gynæcology and Obstetrics in the Baltimore Polyclinic and Post-Graduate Medical School; Professor of Diseases of Women in the Woman's Medical College of Baltimore; Fellow of the American Gynæcological Society, etc.

Read in the Section of Obstetrics and Diseases of Women, American Medical Association, May, 1884.

We learn the functions of an organ, not only by observing the part it performs when present in the system, but also by noting the consequences of its absence.

The cases which we will consider render it evident that the excitement and increased vitality of the sexual organs by which menstruation is preceded are not dependent, as was once supposed, upon any congestion or distension of the vessels of the uterus, or upon any other change in the condition of that organ.

They also show us that the peculiar external characteristics of the female form, and the possession of sexual sensibility, are not all owing to the uterus, and are in no way connected with its presence or development.

Indeed there can be no doubt that the often quoted aphorism of Van Helmont—*propter solum uterum mulier est id quod est*—is perfectly erroneous, and that the distinguishing attributes of womanhood derive their origin not from the uterus, but from the far more important energies of the ovaries and Fallopian tubes.

As many of the abnormal and pathological conditions of the female sexual organs are the result of defective development, occurring either during the period of intra-uterine growth or at the period of puberty, and as several of the cases which I will relate in this paper are the results of such arrest, it may be well to pass briefly in review the different stages of normal development.

About the sixth week of intra-uterine growth the primary elements of the uterus, consisting of a pair of filamentous organs situated on either side of the inferior portion of the vertebral column, and between it and the Wolffian ducts, make their appearance.

These cords, which at first are solid, afterwards become perforated, and are known as Müller's ducts; out of these the Fallopian tubes, uterus and vagina are developed.

Posterior to Müller's ducts and anterior to the rectum a mass of tissue is developed, which helps to form the recto-vaginal wall above and the perinæum below.

Anteriorly Müller's ducts unite with the lower portion of the bladder, and aid in the formation of the urethra, forming the upper portion of its posterior wall.

At about the seventh week the upper portion of Müller's filaments become slightly enlarged and club-shaped; at the lower end of this enlargement they gradually coalesce, and at this point the round ligament is given off, the upper portion separates and forms the Fallopian tubes, while the lower portion forms the uterus and vagina. The point where the coalescence occurs, and where the round ligaments originate, affords a sure point of demarkation between the uterus and Fallopian tubes which in many cases is of great importance.

At about the eighth week the lower portion of the cords, which are hollow, gradually coalesce until by union they exhibit a right and left cavity separated by a septum.

The lower portion of this septum gradually disappears and the outer walls become somewhat thicker until about the fifth month, when the uterus and vagina are distinctly separate.

The upper portion of the uterus at this period is represented by two diverging horns or processes.

During the sixth and seventh months the uterus becomes more cylindriform and of greater bulk, its horns diverge less than before, and from being drawn into the substance of the uterus they seem to be disappearing.

At this period the increased bulk becomes more marked in the cervix, its walls exceeding in thickness the walls of the body of the uterus.

During the eighth and ninth months of fœtal life the disproportion between the thickness of the walls of the body and neck of the uterus continues, and the substance of the cervix considerably exceeds that of the body of the uterus.

This condition exists at the time of birth and is known as the *uterus fœtalis* or *infantilis*. The uterus has now undergone its primary development and its further growth ceases until the period of puberty, when it is to perform its normal function. A few changes, however, do take place in it during this

period, at the time of second dentition, the *palma plicata* of the body of the uterus disappears, and the bulk of the body and cervix become more equal and the organ descends somewhat in the pelvic cavity.

Cases of Amenorrhœa from Congenital Malformation. Miss J. D., age 21, of small stature and delicate physique, has never menstruated nor had any of the premonitory symptoms, the breasts were slightly developed. The external organs of generation were of the ordinary appearance, but when the labia were separated the urethral orifice which was patulous and would admit the tip of the index finger came into view, but the orifice of the vagina was closed, or rather ended in a cul-de-sac about an inch and a quarter deep. The index finger of the right hand was passed gently into the bladder and two fingers in the rectum in order to determine whether the uterus was present or not, when the anterior wall of the rectum was pushed forward by the fingers it came in contact with the finger in the bladder, only the septum being between, no uterus could be felt, in fact about the same sensation was obtained as when the finger in the vagina presses its anterior walls against the finger in the bladder, no ovaries could be detected, the girl had suffered from repeated nasal hæmorrhages, not, however, of a periodical character, she also suffered at times with severe headaches.

In this case the examination revealed the fact that the uterus was not present unless in a very rudimentary form, that although the ovaries could not be felt they were probably partially developed, and that an almost complete arrest of development had taken place in the lower portion of Müller's ducts.

Miss A. R. had suffered for four or five years with periodical headaches, accompanied by intense pain in the abdomen, had never menstruated, although she had taken medicine at various times for the purpose of bringing on her courses. Upon making an examination of the parts the external genital organs were found normal, the hymen which was thick and hard was intact, and nearly closed the vaginal orifice, a small opening only existing in the centre, on passing a sound through this opening a cavity was found beyond which contained no fluid. The hymen was cut through and a small infantile cervix was found projecting into the vagina, the uterus measured only an inch and a half in depth, more than an inch of this belonged to the cervix, the body of the uterus was very thin, and its cavity was not over a quarter of an inch in depth.

Considering this case as one of undeveloped infantile uterus where the arrest of development had taken place either just before or about the time of puberty, some means seemed called for to restore the normal nutrition of the organ and to stimulate it to perform its physiological function.

For this purpose the faradic current was used of moderate strength, the cathode to the cervix, the anode to the spine along the lumbar and sacral regions. The first application was made a few days before the expected time for the return of the periodic headaches, at which time she noticed a slight show of blood, the first she had ever seen; her headache was much diminished and she had only slight pains in the pelvic region.

Her second menstruation occurred more freely, and her general health has much improved; by the third month her menstruation was about normal and her uterus measured 2¼ inches. The application was continued once a week for three months; after the first month the cathode was passed *into the uterus.*

Miss M. T., age 19, of small figure and defective development, was brought to me by her aunt, who stated that the girl had never had her courses, but that lately she had been suffering intense pain in the head, which occurred about once a month, and was generally relieved by the occurrence of a hæmorrhage from the nose, which frequently continued for several hours. Upon examination, the uterus was found small, its cavity measuring only one inch, the cervix presenting the appearance of a small nipple projecting into the vagina, the external os was small, admitting with difficulty the smallest probe. The faradic current was used as in the preceding case and in about three months normal menstruation was restored; the girl developed, and her general health became good; the uterus enlarging to about its proper size.

Kussmaul makes the following very practical distinction between the two arrests of extra-uterine development termed *Uterus Fœtalis and Uterus Infantilis.*

The uterus fœtalis has the form of that belonging to a fœtus at full term. The body is small, six or nine lines in height, and ten to twelve in breadth; the neck, which forms the greater mass, is from 18 to 20 lines in length. The cavity of such a uterus, especially that of the body, is either wanting or very small.

In those cases, however, which we regard as *uterus infantilis* the organ, on the whole, has the form of a virgin one, but is altogether smaller; the most important anomaly is an excess of connective tissue in its walls, which renders them denser and more resisting, the mucous membrane is paler and thinner, and in many instances the rugæ of the cervical canal are imperfect.

The vaginal portion of such a uterus is either very small or entirely absent. Sometimes its presence is indicated by a wart-like prominence with a slight depression leading to the cervical canal.

Mrs. E. S., age 25, married four years; sterile; suffers from amenorrhœa and excessive pain; has her menses at the regular time, but only a few drops. Her uterus was found anteflexed, the cervix conical and indurated. This condition is a very frequent one in sterile women, and results from an arrest of development taking place at the period of puberty. According to Emmet, flexures of the cervix have their origin at this period, or shortly afterwards, by the balance being lost between the relative growth of the body and cervix.

From the earliest development of the uterus, as a rule, until pregnancy, some degree of anteversion exists. With the uterus in this position, the neck cannot be developed to its full length without forcing the cervix forward in the axis of the vagina in the di-

rection offering the least resistance. As the body of the uterus lies forward, the cervix must become bent upon itself at or near the vaginal junction, and thus the flexure is formed. This must take place or the uterus will become retroverted, the result being determined by the fullness or absence of the posterior cul-de-sac of the vagina.

When the cervix is small enough in diameter to be readily bent upon itself the flexure is formed, but if the contrary be the condition and the cul-de-sac be small, retroversion of the organ will occur. Versions of the uterus when they result from defective development have their origin most frequently in a deficient development in the shape and size of the vagina. In such instances the vagina terminates around a cervix of unusual length without forming a posterior cul-de-sac. The consequence is that the neck of the uterus being too long is necessarily crowded forward in the vagina, in the direction offering the least resistance, and retroversion follows. This result may be considered a mechanical one and due to a congenital curve or defect.

Lateral Versions are seldom congenital, but ordinarily result from shortening of the broad ligament after an attack of cellulitis.

In the two following cases of arrest of development, I had the opportunity of seeing the post-mortem results:

Case 1. A lady, aged 19, who four days previous to her death, had a profuse epistaxis lasting about 48 hours, which, taken with the fact that she had never menstruated, and that the nose bleedings were frequent, induced an examination post-mortem of the organs of generation.

The vulva was natural in formation and appearance, with the *mons veneris* and external surface of the labia major well covered with hair; no clitoris could be perceived. The vagina was a simple cul-de-sac about two inches long. It was destitute of rugæ, hymen and caruncula, and had no communication with an os uteri. The bladder and rectum were firmly adherent to each other instead of being separated by a uterus, which was searched for in vain. The bond of adhesion between the bladder and the rectum was the broad ligament occupying its usual position, of a crescent shape, and embedded in a thin horn of this crescent near the summit about one inch and a half internal to, and on the line with, the iliac fossa, was a nodular body dense in structure of the size of an apricot kernel, to which were attached a perfect ovary, Fallopian tube and round ligament. The parts adjacent to the ovaries were greatly congested. The nodular bodies referred to were what would correspond to the superior cornua of the uterus, and the non-striated muscular fibre found in a section confirmed this impression of its being uterine tissue. In this case the patulous condition of the urethra led to the belief that sexual intercourse had taken place.

Case 2. Mrs. A. P. F., age 34, married 10 years, had never menstruated or manifested any menstrual molimen. She was exceedingly well developed and there was no deficiency of sexual desire or excitability. On the contrary, she had been subject to intense sexual excitement occurring at irregular intervals and generally continuing several days. The mammæ, the vulva, the mons veneris, and the pelvis externally were found to be perfectly developed.

The vaginal touch showed that the vagina terminated in a cul-de-sac at a depth of 2 inches. A steel male bougie carried into the bladder could be swept freely to the right and left, and the finger introduced into the rectum, could be felt pressing against it; through the walls of the bladder and rectum a slight elevation on each side of the median line could be felt and was regarded as a rudimentary uterine mass.

On account of the severity of the epileptic seizures her intellect had become gradually impaired.

The post-mortem examination disclosed the following facts. A hard conical nodule was found, on introducing the hand through the abdominal incision, on each side, the two meeting behind the bladder. The finger introduced into the vagina was arrested at about 2 inches, and above this point to the union of the nodules above, a distance of about 1½ inches, nothing existed in the way of fibrous cords, nor the slightest canal.

This was a uterus bipartitus, the body and cornua were solid and contained no cavity.

Complete absence of the uterus has been doubted by many, partly because a more careful study of cases recorded as authentic rendered the presence of rudiments of a uterus presumable or evident, and partly because cases of absence of uterus which are founded simply on examination of living women do not seem sufficiently conclusive, and to this class by far the greatest number of recorded cases belong.

Inasmuch as the Fallopian tubes, uterus and vagina are developed from Müller's ducts, as we have seen, the existence of any, even a small portion of the vagina may be accepted as evidence that the development of the uterus and Fallopian tubes also has at least been attempted, though that development may have been interrupted at any point. Some rudiments of the uterus may therefore be assumed to exist. Notwithstanding this it has been proved that the uterus may be entirely absent, and in such cases the ovaries and tubes may either exist in a rudimentary condition or be also entirely absent. In the former case the rounds ligament branch off at the inner extremities of the ovaries.

If the uterus, ovaries and tubes are absent the external genitals may be either perfect or defective. Whenever the external genitals are perfectly developed, rudiments of a vagina generally exist, and in these cases the urethra is most frequently found very much dilated, so much so that it has frequently served as a vagina.

Emmet reports a case where a surgeon incised a dilated urethra mistaking it for the vagina, and causing incontinence of urine.

An erroneous idea seems to be prevalent that in cases of congenital atresia of the vagina, a patulous urethra always indicates that sexual intercouse has taken place through this organ. This patulous condition of the urethra is the result of an arrest of development and almost invariably accompanies congenital atresia of the vagina, arrest of development has taken place in Müller's ducts, and the anterior

portion of them which joins the bladder and forms the posterior wall of the urethra, is not developed; consequently the opening of the urethra is larger, and is situated below and internal to its normal position—almost in a line with the normal opening of the vagina—and therefore the vagina being closed by atresia, the urethra would more easily receive the male organ. This patulous condition is the primary one, and is the *cause* and not the *result* of penetration. Moreover in cases of *acquired* atresia of the vagina the urethra is never patulous, and sexual intercourse never takes place through it, but on the contrary, the seat of obstruction in the vagina is gradually pushed back by the penis. In these cases of congenital patulous urethra, there is never incontinence of urine.

Morgani, *De sedibus et causis morborum*, Lib. III, Ep. 46, relates two interesting cases of congenital atresia of the vagina with defective development of the uterus and patulous urethra.

The first case he describes as follows: "The vulva of the woman was in a perfect and natural state. But that canal, as they called it in the time of Celsus, into which it opens, and which we now call the vagina, had scarcely run on more than a third part of its proper length, when it suddenly terminated. There was no cicatrix at that place nor below it; the woman herself or her parents could none of them call to mind any ulcer, or any other preceding disorder, in consequence of which the sides of the vagina might have coalesced, for if these parts are ulcerated either from the lues venerea, from the difficult birth or from any other cause where the carelessness of the surgeon or the midwife has coöperated with the disorder, how easily the sides of this canal may grow together. However, not only nothing of that kind had preceded in this woman, but every part moreover, being smooth, shining, and equal when you had opened and dilated the vagina as far as the occlusion, nor indeed did this occlusion in the least give way either to the finger or to the penis of the husband, which had now for three years' space been frequently forced against it."

In Morgani's second case, the woman stated that she was not indeed imperforate, but had so very narrow an aperture, that an eminent physician in a city of great learning, who was at the same time a surgeon, having examined her in early puberty, advised that this aperture should be gradually dilated by introducing such things as were proper for that purpose; but that everything else a more mature age, and a husband, if she should marry, would accomplish. She stated that she had introduced something of the kind recommended, and in some measure had succeeded in dilating somewhat the orifice of the foramen; but could bear no further dilatation, that her husband also, to whom she had been married three years, had by frequent attempts somewhat enlarged the same orifice, but could never enter it. Morgani goes on to state that when he examined the woman and saw the foramen of which she had spoken, he immediately knew that it was the orifice of the urethra out of its situation; and that thanks ought to be given to God, that the woman could not suffer any further dilatation of that passage, as, if she had, the consequence without doubt, would have been, that she could never have retained her urine. Upon further examination, he found the vagina occluded entirely by a solid thick membrane, and he believed the uterus to be absent.

M. Ad. Burggrave, Professor of Anatomy in the University of Ghent, has recorded in the *Annales d'occilis, et de Gynecol.*, 1839, the two following instances of complete absence of the uterus which had come under his own observation:

In the *first case* the vulva had no vaginal orifice; the urinary meatus was situated in the centre of this latter, the contour of which had been ruptured in the act of copulation, readily permitted the introduction of the finger into a sac, the parietes of which were soft and membranous, and which was easily recognized as the bladder. When a catheter was introduced into this sac and the finger into the rectum at the same time, it was evident that there existed no organ between the intestine and bladder, that these were in immediate contact, as is the case in the male sex.

In the *second case* the absence of the uterus was verified by post-mortem examination. The subject of this was a woman 23 years of age, who died in the Civil Hospital of Ghent, of arachnoiditis.

This woman was of robust constitution and plethoric habit; her mammæ were well developed, pelvis large; sexual parts well covered with hair. The vulva presented only a very large meatus, the circumference of which was irregular and furnished with numerous myrtiform caruncles. This meatus led immediately into the bladder, which was in direct contact with the rectum. The ureters, instead of descending toward the base of the vesical triangle, opened immediately within and on the side of the urinary meatus, so that the bladder was situated behind these conduits. The orifices of the urethra were surrounded by sphincters, which were capable of closing them and thus preventing the immediate flow of urine.

Beyond these sphincters the ureters were very much dilated, and this enlargement extends to the kidneys, so that during life these passages had performed the office of reservoirs. The genital apparatus consisted of two ovaries, well formed, situated in the folds of the peritonæum, and containing numerous ova, many of which were in the hydatid state. In the same peritoneal fold, and immediately in front of the ovaries, were the Fallopian tubes; these last had no canal, and were enveloped in a thick mass of erectile tissue. These tubes were joined behind the bladder without communicating one with the other. The subject of this case had never menstruated, and had manifested very marked venereal appetite.

One of the earliest recorded cases of arrest of development and absence of the uterus is related by Realdus Columbus in his work, "De Re Anatomica," in 1572. It is described as vulva rara.

In Case 2 the condition of the hymen as being dense and hard, and nearly closing the vaginal orifice, is mentioned.

There is another condition which is frequently con-

founded with imperforate hymen; this is an occlusion of the lower portion of the vagina immediately behind the hymen. This occlusion is of embryonic origin, and is caused by defective development of the lower portion of Müller's ducts, and is sometimes improperly described as a double hymen. More frequently, however, it is overlooked or mistaken for the hymen itself, from the fact that it is pressed forward by the accumulated blood in hæmatometra and hæmatokolpos, and lies almost in immediate contact with the hymen.

I will state the following conclusions:

1st. Nearly all the malformations of the female sexual organs, previous to puberty, result from arrest of development.

2nd. As the upper and lower portions of Müller's ducts develop independently of each other, we may find the ovaries developed without the uterus, and *vice versa*.

3rd. Perfect development of the external genital organs and the mammary glands does not preclude defective development of the vagina, uterus or ovaries.

4th. Entire absence of the uterus or the ovaries can only be determined by post-mortem examination or by laparotomy.

5th. A patulous urethra is not the result of sexual intercourse through this organ, but is caused by arrest of development.

6th. In congenital atresia of the vagina a patulous urethra is the rule, in acquired atresia it is the exception.

REMARKS ON THE SURGICAL TREATMENT OF THE MALIGNANT DISEASES OF THE UTERUS.

BY WM. H. BYFORD, M.D., CHICAGO.

Presented to Section of Obstetrics and Diseases of Women of American Medical Association, May, 1884.

The malignant diseases that more frequently attack the uterus are:

1st. Epithelioma.

2nd. Medullary carcinoma; and

3rd. Sarcoma.

They occur, according to my observation, in the order of frequency here mentioned.

Probably not less frequently than the sarcoma is found the epithelial or corroding ulcer. Preparatory to the surgical treatment of these affections I desire to make some observations, particularly as to the tissues first invaded by them, their mode of development and manner of destruction. My idea of an epithelioma is that the deposit occurs on the free surface of the mucous membrane, in its epithelial stratum, and consists essentially of extreme multiplication of epithelial cells which, after great development of the tissue in which the process is going on, die, causing sloughs of greater or less size.

This form of malignant disease (call it cancer or cancroid, as you please) is located so that the comparatively dense mucous membrane is between it and the more vascular uterine tissues; hence its cells do not readily find their way into the circulation, and it is at first, and long remains, a local affection.

Another peculiarity is that it does not, until quite late, and sometimes it never destroys the deeper portions of the viscus by ulceration.

The direction is to the surface, and the process of necrosis destroys the superficial morbid growth. The disease is one in which the morbid advancement is away from, instead of into, the substance of the organ.

The second variety of malignant disease of the uterus consists in a great multiplication of cells in the lymph spaces beneath the mucous membrane, which are the terminal cavities of the lymphatic vessels. These cells are probably the epithelial cells of the endothelium of these terminal lymphatics. The deposit is therefore behind the mucous membrane, and really has no barrier to resist the entrance of its cells into the lymph current. This circumstance allows of the early migration of the morbid material to the neighboring and even distant organs, almost as early as they commence formation.

These features of the locality of the deposit are the cause of its greater malignancy, and have given rise to the notion that it is of general instead of local origin. There undoubtedly occur cases in which both varieties coexist from the commencement.

Necrosis in the second variety is caused by the distension of the lymph spaces until the small blood-vessels are strangulated by pressure, and nutrition in the mucous membrane to which they are distributed is arrested.

Small sloughs are detached and thus ulceration is inaugurated which continues till all the invaded tissues are destroyed or the patient dies.

In the third variety of malignant diseases—sarcoma—the cells are generated in the fibrous or connective tissue outside the lymphatics, both in the substance of the cervix and its mucous membrane.

The migration or dissemination of the cells in sarcoma is not so easy or early as in the second, but is more so than in the first variety.

If I am right in this explanation of the difference in the origin and progress in the morbid processes of the malignant diseases of the uterus, it will not be difficult from it to determine the cases to which radical surgical proceedings are applicable, and in which the prognosis under treatment is more or less favorable. I believe that curability is sometimes possible in the first and never in the second or third varieties, but in all, surgery constitutes the most effective means of palliation. There are some cases of epithelial cancer that may be effectually extirpated, and a complete cure accomplished.

A regard for truth requires it to be said, however, that the curable cases of epithelioma are a small minority; but on the other hand it may be said that in a majority of cases life may be much prolonged, and great comfort secured while the patient lives.

Almost all of them are, therefore, proper subjects for surgical treatment. Believing that in this variety

alone a complete removal is practicable, how shall we operate?

If removal of the whole uterus either per vaginam or through the abdominal walls is ever justifiable, the operation should be confined to this variety.

The mortality from this operation is, I think, too great, however, for it ever to gain admission to the category of legitimate operations. The statistics of extirpation of the uterus for cancer have been recently successfully appealed to by Dr. J. Reeves Jackson as evidence that the operation is not justifiable.[1] He very properly concludes that extirpation of the cancerous uterus does not lessen suffering, and it shortens the aggregate of life.

It must be stated, however, in this connection, that the statistics are of much less value than they might be; for while the danger of the operation is the same in all forms; on account of want of discrimination in the reports of the kind of cancer operated upon we cannot judge what the success would be if it was practiced for the epithelial variety alone.

If extirpation is to continue in favor with reckless surgeons it is to be hoped that in future more care will be taken in reporting particularly the nature or variety of the cancer operated upon.

It will then be seen, I have no doubt, that the successes will be on the side of peripheral or epithelial cancer, and the greatest number of deaths will range themselves under the head of interstitial or medullary cancer. I feel assured, however, that more observation will cause the operation of extirpation to be expunged from the future list of operations for cancer of the uterus.

The late Dr. J. Marion Sims, as in many other instances of uterine surgery, took the lead in the appropriate radical treatment of cancer of the uterus.[2]

It is to be regretted, however, that he did not sufficiently indicate the variety of cancer in which he operated, to enable us to know in what cases his process was successful.

Notwithstanding this defect in his reports, to him must be accredited the greatest improvement in the treatment of cancer ever yet made, and in his method we can see the first scientific and successful effort at a radical cure of this almost incurable disease.

In one case of which I was personally cognizant of epithelial or peripheral cancer, he operated over ten years ago, and the patient is now living and apparently free from the disease. His method has since been resorted to by many operators, and, as might have been expected, with varying success, for no surgical procedure will invariably insure a cure in what would seem the most favorable cases.

His method has been modified to some extent by those who have followed him.

It consists in cutting away the whole cervix and as much of the body as will insure the removal of all the disease accessible, followed by thorough and deep cauterization of the whole excised surface. In some cases, as in the one above, this treatment will effect a cure. To perform this operation easily, the patient should be placed on her back, with the hips brought down so as to project slightly over the end of the table, with the limbs flexed over the abdomen (Simon's position), and the perinæum drawn well back. After this preparation the cervix should be seized by both lips if possible, with a vulsellum, and depressed until considerable tension is apparent—no more force than this is necessary or permissible—and an incision made with the knife or scissors through the mucous membrane at the junction of the vagina and cervix, so as to entirely encircle the latter.

Through this circular incision the neck and body of the uterus may be enucleated to any desirable extent. The connective tissue between the bladder and uterus and the peritonæum covering the uterus is so loose that proper care will enable us to separate the latter from its investments, and the portion of the uterus thus isolated may be cut away. When we are successful in removing half or two-thirds of the uterus from its peritoneal investment it is not proper to apply any caustic, as it would be likely to penetrate the bladder or peritoneal cavity.

It is, however, quite advisable to apply the hot iron to the stump of the uterus, for the double purpose of checking the hæmorrhage and destroying the tissue to a still greater depth.

The iron must be below red heat, or else neither of these objects will be accomplished.

If any considerable hæmorrhage attend or succeed this operation, the cavity should be filled with cotton saturated in a solution of Monsel's iron half strength. This operation is applicable to cases where the disease has not invaded the cavity of the uterus to any considerable extent.

But there are cases where the mucous membrane of the cervix and body is the subject of epithelial degeneration while that covering the external portion of the neck is not affected. The disease is then not generally curable except by complete extirpation of the organ. It may sometimes, however, be effectually removed in its early stages by excavation with the curette and caustics. Later, when the fibrous structure of the organ is softened by the deposit, this cannot be done. The object of the operation is to remove the *whole* mucous membrane with the deposit, and it will require great care to do this. The uterus should be drawn down and fixed with the forceps by seizing the posterior lip, and then a small sharp curette introduced to the fundus, and by forcibly carrying its sharp edge over the whole surface first in one direction and then another until the tissue removed is entirely free from the morbid deposit.

It will often be best to use larger curettes as the scraping proceeds. Judging from my own observation there is not much danger of cutting through the wall of the uterus when the case is one of epithelial degeneration of the mucous membrane instead of cancerous degeneration of the parietes. The latter kind of deposit renders the tissues friable and they break down under the curette. In the cases of pure epithelioma as I have defined the affection, that friability does not exist, and if we go through the wall it is by using too much force.

After we have thus thoroughly removed the disease

[1] Gynæcological Transactions for 1883.

[2] *American Journal of Obstetrics.*

from the cavity we should increase the probability of a cure by the introduction of a caustic.

This part of the operation should also be done with a thoroughness that attacks every portion of the cavity.

For this purpose I think the acid nitrate of mercury the best caustic. Small pellets of cotton saturated with the acid, afterwards squeezed as nearly dry as possible, and if prepared several days before used so much the better.

Each one of these should be well secured by strong thread, that they may be easily removed.

The uterine cavity should be packed full of these and then the vagina should be filled with absorbent cotton pressed well up against the cervix.

Chloride of zinc, nitric acid or bromine may be substituted for the acid nitrate, but I believe the mercury in this latter preparation adds to its efficacy.

When we use the caustic in the scraped cavity we should remove it in about twenty-four hours and then keep the parts clean by irrigation.

If there is any return this operation may be repeated as frequently as necessary. In some instances where I have repeated this operation two or three times, I have found the uterine cavity becoming smaller each time. The diseased surface therefore becomes less after each successive operation.

In an excellent paper published in the *American Journal of Obstetrics* for April, 1882, Dr. W. H. Baker, of Boston, gives a flattering account of his success with the operation for the removal of a part of the uterus, per vaginam.

He reports six cases in which after the lapse of five years there was no return; so they are probably entirely cured, and that in thirty cases he has had no deaths.

This encouraging report establishes the *efficacy* and *safety* of the operation when skilfully done.

While I fully accord to Dr. Baker great credit for his labor in this direction, I must be allowed to complain that he has not been sufficiently definite in the description of his cases to enable us to distinguish between those in which the disease began in the mucous membrane, and such as were of interstitial origin; and I protest that no such success can be attained where the deposit was located in the fibrous structure of the uterine walls. I wish also to disclaim any pretension that even in the earliest stages of development all these cases can be cured.

I only desire to be understood as believing that it is the most promising and safest method of treating the disease when confined to the mucous membrane, without any considerable tumefaction and distortion of the cervical parenchyma. My own cases are not very numerous, but among them I think I can count at least six cases of success, and more, in which I have strong hopes that there will be no return of the disease.

In almost all cases and all kinds of malignant diseases of the uterus, surgery is the important palliative means.

While hæmorrhage, pain, mental worry and other conditions contribute to the general result in cancer of the uterus, nearly all the sufferers die of septicæmia.

The absorption of putrid material connected with the process of necrosis or sloughing of the tissues invaded by the deposit, so poisons the blood that septic fever is sure to be established.

The septic symptoms are influenced in their intensity by the amount of sloughing, and the power of resistance afforded by the constitutional condition of the patient. Usually almost no symptoms present themselves during the time the deposit is going on. When the tissues commence to break down the cancerous cachexia begins to show itself, and cancerous cachexia simply means septicæmia. Its peculiarity depends upon the fact that it is slowly established. When once established it gradually increases in severity until the patient succumbs to its exhausting influence.

In interstitial cancer we may alleviate the symptoms by removing the sloughing surface by the free use of the sharp curette. In many instances where the sloughing surface is large and the sanious discharge very great, shaving off the entire necrosed substance down to the living tissue will arrest the septic symptoms so completely, and relieve the suffering to such a degree, as to inspire the patient with hopes of recovery.

The operation of curetting should be resorted to early and repeated frequently, until the destruction of the organ is so great as to render it impracticable.

The process of removing the necrosed tissue with this instrument, is simple and free from danger. If the cutting is carried only far enough to get away the sloughs down to the underlying living tissue, no blood-vessels will be severed large enough to give rise to serious hæmorrhage.

Probably the greatest danger consists in tearing through into the peritoneal cavity, and wounding the bladder, ureters and rectum. In the advanced stages of the disease, when the deposit extends to these parts, such accidents may be rendered imminent.

They may for the most part be avoided even then, and until far advanced they may always be avoided. Such accidents usually occur as the result of too much pressure upon the instruments, and the effect is not so much by cutting as by tearing the tissues rendered friable by the existence of the deposit in them. The curette should therefore be very sharp, and it must be applied so lightly that the process is one of cutting only.

The instrument ought to be very small as well as sharp, so that it may be carried with facility into all minute sulci of the affected parts.

Every part brought under the instrument must be plainly visible, and the whole operation should be guided by the eye. This may be best accomplished by dilating the vagina well with Simon's instruments and allowing a stream of water to forcibly run into the cavity through an elastic hose connected with an elevated fountain. This current of water, if well directed, will wash out the clots and sloughs so completely that we can all the time see the depth and extent to which the strokes of the instrument extend. I must insist that this operation, thus lightly and

thoroughly done, may be executed without giving the patient any considerable inconvenience, and also that it ought to be often repeated from the time the septic symptoms begin until the sloughing parts can no longer be reached.

I believe that caustics cannot be made half as efficient for this purpose as the curette. The process of curetting the surface of the superficial cancer for removing the sloughing material is also the most efficient means of palliating the symptoms when they cannot be cured. Of course I do not wish to ignore the value of disinfectant applications as palliative measures. After curetting, and sometimes without it, the free and frequent application of the muriated tincture of iron will often so disinfect the surface as to keep in abeyance the septic symptoms for a long time.

The value of this remedy I believe was first taught by the late Sir James Y. Simpson, and so greatly did he esteem the application that he believed in certain cases the advance of the disease might be arrested for an indefinite period.

SUMMARY.

1st. The more common forms of malignant diseases of the uterus are:

(*a*) Epithelial or superficial cancer, commencing on the free surface of the mucous membrane.

(*b*) Interstitial (medullary) cancer, commencing in the fibrous structure, the deposit being within the lymph spaces.

(*c*) The coexistence of these two varieties.

(*d*) Sarcoma, in which the cells are mingled with the fibres of the connective tissue.

2nd. The superficial cancer can often be removed and consequently cured.

(*a*) By ablation of the cervix and as much of the body as necessary.

(*b*) When affecting the mucous membrane of the whole cavity, by thoroughly and repeatedly curetting all the morbid deposit away and cauterizing with acid nitrate of mercury, bromine or chloride of zinc.

3rd. The interstitial variety is incurable by any method of operation or by any means.

4th. Frequent and thorough removal of the necrosed down to the living tissue by the curette is the most efficacious of palliative measures in the latter variety.

POLLUTION OF THE UPPER OHIO, AND THE WATER-SUPPLY OF THE CITIES AND CHIEF TOWNS WITHIN THE FIRST HUNDRED MILES OF ITS COURSE.

BY JAMES E. REEVES, M.D.,

SECRETARY OF THE STATE BOARD OF HEALTH OF WEST VIRGINIA.

Read before the American Public Health Association, at the meeting in St. Louis, October 16th, 1884.

The condition of health and probable duration of life of a people may be correctly measured by the quality and quantity of their water-supply. Indeed, good health can as little be supported without pure water as without pure air; therefore, of all the diversified and complex relations which man bears to surrounding influences, none are more important than that which relates to the water-supply of the locality in which fortune has placed him.

Considered either in his physical, social, moral, industrial, or political relation, the subject is of transcendent importance, for it involves the main questions of success in life. If he take up his abode in the midst of unsanitary surroundings, the inevitable sequence will be a correspondingly unfavorable influence upon his destiny — a check upon his prosperity, and a blight, more or less serious, upon all those attributes which are usually considered essential to his well-being and happiness.

As a natural corollary, the community which is ignorant or regardless of its sanitary surroundings and vital history, is but feebly defended against "the pestilence that walketh in darkness, and the destruction that wasteth at noonday;" for the wholesome lessons of domestic and civic hygiene afford to such a people no rules and defenses for the person, the domicile, the municipality and the State, nor encouragement to the general prosperity in stimulating the practical applications of science and art, commercial enterprise, manufactures, and popular intelligence. All these are at a low standard, while frequently recurring endemic and epidemic diseases, and a high death-rate, constitute the most prominent features of their culpable history.

River pollution from sewage and other supplies of refuse and corruption in towns and cities has assumed such fearful proportions that the question presses itself upon wise men and sanitarians—"Is industry free to tumble out whatever horror or refuse it may have accumulated into the nearest crystal brook, regardless of gods and men, and little fishes; is free industry free to convert all our creeks and rivers into sewers?" "It is ours," says Dr. Gairdner, "to use air and water, and then pass them on; but woe to the man or the community that detains or imprisons these his servants of the hour in their further execution of God's endless work!"

With these introductory reflections, I now submit the following brief statement of facts relating to the water-supply of the cities and chief towns situated on the banks of the Ohio River within the first hundred miles of its course.

Commencing at the head of the Ohio, there are two cities—Allegheny and Pittsburgh—whose aggregate population is not less than 240,000. Next, Rochester, Pa., a town of 3,500 population; next, East Liverpool, O., with a population of over 6,000; next, Wellsville, O., with a population of 4,500; next, Steubenville, O., with a population of 14,000; next, Martin's Ferry, O., opposite Wheeling, with a population of 4,600. On the West Virginia shore, between Wheeling and Pittsburgh, the principal towns are New Cumberland, with a population of 1,500, and Wellsburg, 16 miles distant from Wheeling, with a population of 2,000; next, Wheeling, with a population of 31,500; next and last, Bellaire, O., with a population of 10,000.

And thus, not including many smaller towns and thriving villages which mark every few miles of the Pennsylvania and Ohio shore, and whose varied industries in manufactures give employment to thousands of laborers, there are above Wheeling four cities and five towns whose aggregate population amounts to 275,000.

Besides refuse representing accumulations of filth of every conceivable character from family domiciles, stables and barnyards, privy vaults and other cesspools, sewage outlets, and manufacturing establishments, the Ohio River is made the convenient receptacle for the disposal of diseased or worthless carcasses; and thus thousands of tons of corrupting matter are daily thrown into the stream which supplies the water we drink. No wonder then that diarrhœas and typhoid fever are so common, and the death-rate from these diseases is so high.

But let me be more specific in my statements. Passing Rochester, at the mouth of Beaver River, 26 miles below Allegheny and Pittsburgh, without further record than that its water-supply is from wells contaminated with surface putrilage, and in many instances, no doubt, by leaks from privy vaults and drains from kitchen sinks—and that typhoid fever is a frequent disease in that community,—we come to East Liverpool, 19 miles further down the stream. Here the population is supplied with water pumped from the Ohio and distributed from a reservoir. The supply pipes to the pumps are located about 200 yards above the city, and extend into the river far enough to take the water from the current, below low-water mark. There are but few wells in use; and fewer cases of typhoid fever have occurred since the erection of water-works than before, or when the water-supply was wholly drawn from wells. During those years, house and street epidemics of typhoid fever were not infrequent.

At Wellsville, 4 miles below East Liverpool, a well, or *crib*, as it is called, was made near the river's edge, a year or two ago, for the purpose of securing for the town a sufficient supply of clear water—the authorities believing *clear* water and *pure* water to be convertible terms. This crib, 10x16 feet in the square, and 12 feet deep, was encased with timbers and tightly covered with the same material. From such a "hole in the ground" the water-supply was pumped into a larger basin on the hill. It was confidently expected in that way to procure "pure filtered water from below the bed of the river;" but the supply was found to be so foul and unwholesome that it was not fit for use, and the crib had to be abandoned. Since then, the supply has been drawn directly from the current of the river, above the inflow of the town's refuse, and distributed from a reservoir 300 feet above the river-level. But this better water-supply has not secured the citizens of Wellsville against typhoid fever cases which appear at all seasons of the year.

For the foregoing history of the sanitary situation in East Liverpool and Wellsville, I am indebted to R. H. Hill, Esq., of East Liverpool, and Dr. J. W. Hammond and S. Stevenson, Esq., of Wellsville.

From Steubenville, 20 miles below Wellsville, Dr. Gustav Shane, of that city, has kindly sent me the following description. He says: "This city is supplied with water pumped from the Ohio River into a large reservoir on a neighboring hill, and from thence direct to the consumer, by mains and cross-mains. The basin or reservoir is made of brick laid in and covered with cement, and of sufficient capacity to supply the ordinary wants of the population—14,000—for about 3 days. The supply is taken at a point *below* both the geographic and population centre of the city, but the receiving-pipes are laid to and beyond the channel so as to avoid contamination from surface drainage and sewage.

"The quality of the water drawn from the mains is apparently good, clear, free from odor, and not unpleasant to the taste except when the river is turbid. But few wells are in use in the main portion of the city; but a part of one ward—on the first river-bench—is supplied with well water.

"The city is not sewered, and the privy system is the time-honored one of deep vaults, which, when full and abandoned, are covered with earth, and in this way the surface is completely honey-combed.

"There are at all seasons of the year cases of typhoid fever occurring sporadically, but the disease has not prevailed as an epidemic for many years. That part of the city in which well-water is used, appears to have the largest percentage of febrile cases, and, I believe, a preponderance of the typhoid type. Dr. Stanton, the oldest practitioner in the city, whose experience antedates the river water-supply, informs me that typhoid fever was much more common under the well-system of water-supply than since the establishment of the water-works. Thirty-five or forty years ago, or before the adoption of the river supply, house and neighborhood epidemics of typhoid fever were quite frequent, whereas, at present, such outbreaks are almost entirely unknown.

"Isolated cases of diphtheria are also constantly occurring, at irregular intervals, in Steubenville, but no general visitation of this disease within the last 15 years. During the winter of 1878 and '79, a fatal neighborhood epidemic of diphtheria occurred, limited by street lines, and embracing about one-fourth of the population of the city. Scarlet fever prevailed at the same time in severe form, and in many instances the two diseases—scarlet fever and diphtheria—were associated in the same patient. There seemed to be no cause for this visitation other than contagion."

The next place on the line of this inquiry is Martin's Ferry, 20 miles below Steubenville, and immediately opposite Wheeling. Here the water-supply is from wells varying in depth from 15 to 50 feet, dug through a rich loam, yellow and blue clay, sand and gravel. The town is not sewered, and in some instances the well and the privy vault are in dangerous proximity. On account of the general topography of the town, and the superficial clay-substratum, all refuse and surface matter which does not find immediate entrance into the well-water supply, is quickly drained into the Ohio river. The result of the unsanitary condition is the constant prevalence of typhoid fever of a grave and fatal type in Martin's Ferry.

And now having reached Wheeling, the chief city in West Virginia, the situation is even more uninviting than the unsanitary pictures we have been inspecting; for it is within the truth to state that, including the population of Martin's Ferry, the refuse from the homes of 10,000 people finds entrance into the Ohio river immediately *above* the point of supply to the water-works' pumps. And if filth from hundreds of households, manufacturing establishments, privy vaults and other cess-pools, horse and cow stables, and the stinking bodies of dead animals, were all of the sources of pollution of the water supply of Wheeling, its citizens might congratulate themselves that, at least, they are not worse off than some of the neighboring cities; but, in addition to the sources of pollution just mentioned, an old and dilapidated cemetery—Mt. Wood—occupying the hill at the northern part of the city, and within a half mile above the water-works, is a highly probable factor of contamination.

The greater part of the coal-measure underlying this cemetery has been removed, and the cap-rocks have broken and sunken, causing large seams or cracks through the hill; and the inclination of the drainage, both surface and subterranean, being towards and into Jonothan's Ravine, at the foot of the hill, which empties its current into the Ohio within the city limits, it is therefore highly probable that the water-supply in the basin is polluted by the corruption escaping from the graves and vaults in Mt. Wood.

The water-works, though greatly improved by new machinery within the last year, occupy the same site upon which they were originally erected more than 40 years ago, when Wheeling was not one-fifth of its present size—31,500.

The basin or reservoir is located on Wheeling Hill, 275 feet above the bed of the Ohio river, and has a capacity of 800,000 gallons. Its small size necessitates constant use of the pumps both day and night to keep the mains full; therefore at all times the quality of the water in the basin is the same as that in the current of the river. In other words, if the water in the river is muddy, the supply in the basin is likewise turbid and disagreeable to drink.

In hope of securing a clear and wholesome water—but unmindful that clear water is not always pure water—the Board of Water Commissioners, last year, concluded to repeat, with some improvements, the experiment made at Wellsville of a crib or well below the bed of the river; and accordingly a hole, 15 feet deep and 20 feet in diameter, was dug through the sand-bar, in the bed of the river, near the Island shore, and about 200 yards above the present point of supply to the basin. This well or crib was substantially walled with brick laid in cement and tightly covered with heavy timbers, bolted to the wall, to prevent all leakage from the current. The water that soon filled this well or crib, by percolation, was so clear and beautiful in appearance that the Board, a few weeks ago, contemplated the immediate establishment of three additional cribs, side by side with the one just described. Fortunately, however, before making such outlay of the public money, and connecting such cribs or wells with the water-works and the basin, the Board wisely determined to have the waters in the crib and in the basin analyzed; and specimens were forwarded to Dr. Charles Smart, of the U. S. Army, for that purpose. The following is Dr. Smart's report of the analysis:

SURGEON-GENERAL'S OFFICE,
WASHINGTON, D. C.,
September 26, 1884.

DR. JAMES E. REEVES, SECRETARY STATE BOARD OF HEALTH, WHEELING, WEST VIRGINIA: *Dear Sir:*—I have received yours of the 19th inst., invoicing two half-gallon specimens of the water-supply of the city of Wheeling, West Virginia, and requesting me to make an analysis of the water, and to report in such terms as may be authorized by the results of the analysis. The specimens were received in good condition, in green glass bottles securely corked. One was marked "No. 1, Island Crib;" the other, "No. 2, City Reservoir."

No. 1. This water was clear, transparent, and free from color and odor. A slight sediment of a dark color, pulverulent and somewhat granular, had collected in the bottom of the bottle. This sediment consisted of organic matter so disintegrated that its origin could not be discovered; several of the larger granules were composed of the disintegrated matter aggregated on small fragments of cotton fibre. It swarmed with bacteria and bacilli, and showed many minute protoplasmic masses and some larger masses presenting amœboid movements, but contained none of the algæ and infusoria which are so common in waters that are in general use as potable waters. Generally speaking, waters that are free from the actively-moving ciliated infusoria, and that present a comparatively dead microscopic field, are waters that have percolated through a very pure or a very impure soil. In other words, they are very pure spring or very foul well waters. In the one case the field presents silicious particles, diatoms and the filaments of the conferoid genera; in the other the microscopic appearances are those mentioned as observed in the sediment of the specimen under discussion.

Under laboratory treatment the water was found to give a residue constituting 49 parts in the 100,000. Twenty of these parts were dissipated by heat, and consisted principally of the nitric acid of nitrates. There was but little recent organic matter in the residue—scarcely enough, when ignited, to darken the inorganic film with a fleeting coloration. In this respect the water residue was similar to that of a pure spring-water; but it differed from the latter in the strong nitrous fumes which were evolved during the application of the heat. The presence of the nitric acid was also developed by Sprengel's solution; but it was not considered needful to determine its amount directly, as the operations on the residue indicated that two-thirds of the 49 parts in every 100,000 of the water consisted of nitrates, and the remainder of chlorides, carbonates and sulphates.

The chlorine present amounted to 1.9 parts in 100,000 of the water, which is equivalent to 3.1 parts of chloride of sodium. This is not a large chlorine figure, considered in connection with the

nitrates present, and indicates that the organic matter whence the latter are derived is not wholly, or, indeed, chiefly, a sewage material, although sewage may be present in it.

The free ammonia in the water measured .014 part per 100,000. This is a larger quantity than is usual in percolated waters known to be of good quality, and indicates, with the strong trace of nitrous acid which was found by Griess's delicate test, that the organic matter from which the nitrates are formed is not distant from the reservoir in which the water is collected, or that the filtering material or soil through which percolation is effected, is itself of such an impure character as to be incapable of effectually purifying the water in its transit.

A similarly small amount of recent organic matter is indicated by the quantity of oxygen required to oxidize it, to-wit: .110 part per 100,000 of the water.

From the rapid manner in which the albuminoid ammonia was eliminated in the laboratory experiment, from the relatively small proportion of carbon present, as indicated by the small quantity of oxygen required, and from the large amount of nitrates and small amount of carbonates in the residue, it is inferred that the small quantity of organic matter present in the water and the very large quantity which has recently been reduced to the inorganic form of a nitric acid salt, are of animal derivation. No undecomposed sewage is present in the water, but the quantity of chlorine renders it probable that decomposed sewage is not absent.

In the absence of all knowledge of the surroundings or natural history of this water, the analyst cannot speak with decision upon its probable unwholesomeness. The microscopic appearances of its sediment are against it, as well as the greater part of the analytical results. It is true that there is in the water only a small quantity of unreduced organic matter, but there was a much larger quantity present in it a short time before it reached the reservoir whence it was drawn. This water, indeed, appears to be an example of the class which led the writer to generalize as follows in his report on the waters of Memphis and other Southern municipalities (Annual Report Nat. Board of Health, 1880, page 485): "On the other hand, when a well which is liable to an impure inflow, as evidenced by the co-existence of nitrates and nitrites, furnishes a sample which is free from albuminoids, and from oxidizable organic matter, the microscopic characters may give direct assurance that the water has not always been as pure as the sample submitted for analysis."

Although there is not much recent organic matter in the water submitted, the surroundings of the reservoir from which the water was collected are evidently such that at any time an increased inflow might carry undecomposed organic matter into it. As it is, the last traces of the organic matter are in progress of change. The nitrogen of the nitrates in a water may be as much dissociated from the organic matter which it at one time constituted, as the chlorine of the chlorides in the water of the ocean, but in this instance the nitrates are undoubtedly a recent formation, for the process of reduction is in progress in the water as submitted for examination. Nitrates alone are viewed by most sanitary authorities as indicating dangerous probabilities in a water. Frankland says that large quantities of nitrates convict water of previous pollution by organic matters of animal origin, and calls them an indication of the "previous sewage contamination" of the water. Some, as Ekin, of London, condemn as dangerously polluted waters which contain so small a quantity of nitrates as .5 or .6 part per 100,000, and Reuben Haines has met with cases which sustain Dr. Ekin's position. Without subscribing to the dangerous qualities of waters which contain so small a proportion of nitrates, the experience of the writer leads him to believe that, excluding the presence of existing organic matter, a water is to be regarded with suspicion in proportion to the amount of nitrates present, and that assuredly the water-supply of a city should not contain the very large quantity of nitrogen as nitrates which was found in the sample marked "No. 1, Island Crib," from the city of Wheeling, West Virginia.

More particularly dangerous are the waters which show a connecting link between the nitrates and their organic derivation in the form of traces of existing nitrites. In a recent investigation into the processes of water analysis, Professor Mallet, of the University of Virginia (now of Jefferson Medical College, Phila.), under whose direction the experiments were conducted, concluded that the danger was associated with the presence of nitrates and nitrites. In his report (page 203, Annual Report Nat. Board of Health, 1882) he says: "Looking at the results from the natural waters of classes I and II, and bearing in mind the conclusions reached by Müller, Schlæsing and Muntz, Storer, Warrington, and others as to the process of nitrification being due to the presence of an organized ferment or ferments of bacterial character, the idea suggests itself whether the noxious character of waters containing largely nitrates and nitrites —themselves presumed to be harmless—and but very little organic matter—which ought to be present of some sort, to support the previous contamination view—*may not be in reality due to the presence of a specially nitrifying ferment, itself to be classed among the lower organisms capable of propagating disease.*"

Nitrates and nitrites are harmless in themselves so far as we know. So, also, are the ordinary organic matters, animal and vegetable, from which these salts are formed, at least where existing in quantities which do not render the water containing them repugnant to the senses. It is not the ordinary organic matters of the world, decaying garbage, animal fragments, and even sewage, nor the nitrogen salts formed from them, that are dangerous when taken into the system with the water-supply, but certain morbific micro-organisms which may accompany them. These micro-organisms, which are the probable cause of cholera, typhoid fever and other specific diseases, are associated in particular with waters which contain nitrates and nitrites, and, indeed, it is not unlikely that the living ferment which effects the nitrification of organic matter may itself be morbific.

No. 2, CITY RESERVOIR. This water was clear,

transparent and free from color and odor. It contained a slight pulverulent sediment of an olive color, which consisted of disintegrated organic matter and some mineral particles, swarming with infusorial life, but without any algoid forms and with few bacteria.

The water yielded a residue amounting to 14 parts in the 100,000; of these, 10 parts were mineral matter and 4 organic and volatile. The organic matter was not present in such quantity as to give a dark coloration on ignition of the residue, nor were any fumes or odors evolved during the process. Chlorine was present to the amount of 2.1 parts, equivalent to 3.5 parts of chloride of sodium in every 100,000 parts of the water. No nitrates were present other than the minute quantity—less than Dr. Ekin's limit—usually found in river water. A trace of nitrous acid was present, indicating that the organic matter of the water was undergoing change to the inorganic condition. The free ammonia amounted to .013 part and the albuminoid to .017 part per 100,000 of the water, while the oxygen required to oxidize this weighed .160 part.

River waters are very variable in their constitution. During the periods of spring snow-meltings, and autumnal rainfalls, when the stream is swollen and turbid, its waters usually attain their maximum of impurity. The organic matter on the surface of the area of drainage is washed into the bed of the stream, and the rapidity of flow prevents sedimentation, which is an important purifying agent. In seasons of drouth, on the other hand, when the water-level is low and the current fed less by surface-shed rain showers than by tributary springs, the water is usually less impregnated with organic matter. From the transparency of the sample furnished and its minute quantity of pulverulent sediment, the analyst infers a low water-level at the time the specimen was collected. The specimen therefore represents the river-water in its best condition. The albuminoid ammonia distilled from the sample is not above the average of that obtainable from good river-waters; but the free ammonia and chlorine are in excess, and suggest a sewage inflow into the stream. If the sewage were suspected to enter in mass at one particular point, its influence on the quality of the water might be ascertained chemically by determining the free ammonia and chlorine in specimens collected above and below the point of supposed entry; but usually such determinations are unnecessary, as the point at issue may be better determined by a sanitary inspection of the area of drainage.

Sewage is decomposed by the influences acting in running water, and leaves only its skeleton in the form of the inorganic chlorides. The presence of the evanescent ammonia indicates a more recent contamination and a less perfect decomposition. But whether decomposed or undecomposed, sewage contamination is dangerous, not in itself; for waters polluted with sewage have been used for ages with impunity, but in that it may be accompanied by and be the means of spreading the infection of typhoid fever and cholera. The former has long been known to be preventable by the use of water which is free from sewage contamination, and the recent researches of Koch into the etiology of the latter indicate that a sewage-contaminated drinking-water supply is the most active agent in its propagation.

Respectfully submitted,

CHARLES SMART,
Surgeon U. S. Army.

The following supplemental report is not less interesting and instructive:

SURGEON GENERAL'S OFFICE,
WASHINGTON, D. C.,
September 29, 1884.

DR. JAMES E. REEVES:

Dear Sir:—Your letter of the 26th instant informing me of the history and surroundings of the water sent to me for examination, and marked respectively "No. 1, Island Crib," and "No. 2, City Reservoir," has been received and carefully considered in connection with the analytical results obtained from the waters in question. In my report on "No. 2, City Reservoir," I stated the probability of sewage inflow, and suggested a sanitary inspection of the drainage area as a more trustworthy means of determining a contamination of this character than is the laboratory work of the sanitary chemist. If the sewage is present in large quantity, and is not decomposed by natural causes, the urea present may be detected and estimated by the chemist. But urea is speedily broken up and leaves only the chlorides which accompanied it, with or without a trace of free ammonia, to evidence its recent existence. The sanitary inspector is therefore better qualified in many instances than the sanitary chemist to detect the presence of sewage in a water. Especially is this the case in surface waters where the water-shed and all its possible polluting influences are more or less known.

The germ or poison of typhoid fever may or may not be present in sewage. If it be not present the sewage is harmless as far as concerns the propagation of that disease; if it be present the water will convey the infection of typhoid fever whether the sewage is decomposed or not. In fact there is no evidence that the agencies which destroy ordinary organic or sewage matter in its course down stream have the slightest influence in destroying or removing the cause of this fever. On the contrary, all the evidence that has accumulated of late years shows the persistence of the germ or poison after the destruction of the sewage material which originally accompanied it. In the Lausen epidemic, for instance, there was not only a flow of several miles, but a filtration through the soil which sufficed to remove the minute cells of wheat-starch; yet the fever was undoubtedly disseminated by the infected water of the springs.

Instances of typhoid fever caused by well-water from which all trace of the sewage has disappeared, are of common occurrence in the recent records of medical progress. Before a city which uses a sewage-polluted water-supply can claim that the use of such water is not injurious or unwholesome, its health reports should show that typhoid fever is a rare disease among its citizens, although existing in the cities which cast their sewage into its water-supply.

The detection by chemical means of sewage in a water is therefore a matter of no moment. The point of interest is the contamination of the water-supply. If this is proved, the water is dangerous, and is undoubtedly the cause of much preventable sickness, which is accepted by force of habit as a normal condition.

It is not always in the power of an individual to prevent the sewage pollution of his water-supply by others who live above him on the water-shed; but it is always in his power to prevent his water-supply from being defiled by his own excreta. The sanitary laws which apply to individuals apply to their aggregation as communities. The city may not be able to prevent all defilement of the stream, but it is surely competent to preserve its citizens from swallowing their own filth, diluted but not rendered innocuous thereby, in its organized system of water-supply.

The water marked "Island Crib, No. 1," which I reported to you as a surface water that received a large amount of nitrates and nitrites during its percolation through some filtering material, I now understand to be the river water which has percolated through a sand-bar into a well or other reservoir. When the river is flooded and turbid, the filtration, of course, will remove the turbidity and give a clear water. But clearness and purity are not synonymous terms when applied to water-supplies. A water which contains strychnia might be perfectly clear. The Lausen water, in Switzerland, above referred to as having caused a deadly epidemic, was perfectly clear. At the present time the river water is as clear as the filtered water. They are, however, by no means the same waters. The one contains only 14 parts of solid matter per 100,000, the other 49 parts. The increase is the result of the filtration. It consists of nitrates and nitrites recently formed from organic matter. The organic matter which yielded them did not exist in the river water. It was therefore derived from the filtering medium, and freedom from turbidity is purchased at the expense of a dangerous change in the character of the water. I need not repeat what I have already said in my report as to the quality of this water. It is wholly unsuited for a potable water-supply, especially for a large community where the well-being of so many are at stake.

Sincerely yours,

CHARLES SMART,
Surgeon U. S. Army.

It is thus seen how narrowly the people of Wheeling escaped a positively dangerous water-supply, and it is to be hoped other communities may profit by the example. When Dr. Smart's report is read by the light of the history I have given of the surroundings, especially by the light of that unerring indicator of the character of the water-supply—the frequency of typhoid fever—it leaves no doubt on the subject.

An interrogation of the death-returns on file at the City Health Office shows that in the last 10 years there have been 460 deaths from typhoid fever, and 225 deaths from diphtheria within the same period. Indeed, typhoid fever is present at all seasons; some years showing a much larger mortality than in others. For example, in the year 1879 there were 90 deaths in Wheeling from typhoid fever, while in 1880 there were but 52 deaths from the same cause. The same is true of the prevalence and fatality of diphtheria.

There is an easy remedy for the present impure water-supply in the city of Wheeling, namely, the extension of the receiving pipes three miles up the river, or to a point above the town of Martin's Ferry. When this improvement shall have been made, Wheeling may justly boast of having an abundant supply of the purest water the Ohio River can furnish, and fewer cases of typhoid fever.

The next and last city to be named in this record is Bellaire, Ohio, the northern limit of which is but a half mile below the southern boundary of Wheeling. It has a population of 10,000, and is supplied with water pumped from the Ohio at a point within a half mile below the place used by the city of Wheeling for dumping night-soil and other corrupting refuse. In other words, the citizens of Bellaire swallow with the water they drink all manner of abominable filth from the city of Wheeling, and they pay a fearful penalty for their utter disregard of sanitary laws. Typhoid fever and diphtheria prevail in malignant form at all seasons, and the death-rate from these diseases exceeds that from all other causes combined.

Finally, it were well if the boasted civilization and refinements of the age in which we live could be presented in fitting contrast with the sanitary works of the ancient Greeks and Romans, who well understood the value of pure water. Vitruvius informs us that as an evidence of the practical wisdom of the ancient Romans, who were often regulated in their conduct and opinions—especially in military matters—by the Augurs and Soothsayers, they frequently consulted the appearances presented in the livers and spleens of animals with a view of ascertaining the state of the air and the waters of a country, the healthfulness of its food-productions, its pasturage, etc., and to regulate their choice of sites for the building of cities.

Even to this day, though so far fallen from her high estate, Rome is supplied with good water conveyed from a great distance by aqueducts which were built in the days of her splendor and renown.

MEDICAL PROGRESS.

MATERIA MEDICA AND THERAPEUTICS.

ON THE USE OF SAND-BATHS AS A BALNEO-THERAPEUTIC AGENT.—Dr Suchard, in charge of the hospital and baths at Lavey (Switzerland), has prepared an apparatus which allows of the heating of a large quantity of sand for bathing purposes. His description of its use is very interesting (*Jour. de Med. et de Chir. Pratiques*). His first case was that of an anchylosis of the knee-joint caused by an arthritis of two years' standing. He placed the leg and articulation in a box made for the purpose and filled with heated sand. After a few days of this treatment, the œdema and doughy feel of the tissues disappeared,

and a very marked increase in the temperature, circulation and sensibility was noted. Experiments have shown Dr. Suchard that the temperature of these baths can be much higher than with water. A temperature of 112° to 122° F. is very agreeable to stout patients or elderly rheumatics. Scrofulous swellings with torpid circulation and cold extremities, are not satisfied with less than 131° F. In cases of sciatica, localized rheumatism, and anchylosed or atrophied limbs, the temperature should be as great as 140° F. to give the parts a proper degree of warmth.

The first impression of the patient when placed in the bath is that of comfort; in about five minutes comes a feeling of discomfort and oppression, then relief comes when transpiration is established. From this fact the temperature of the body is not elevated and maintains its equilibrium in a medium of much higher temperature than its own. Finally, after a time varying from twenty-five minutes to three-quarters of an hour, the heart is accelerated in its action, and the respiration becomes more frequent; and these symptoms indicate that it is time to leave the bath.

One peculiarity of the bath is that it permits of the application to the affected part of sand of a higher temperature than to the rest of the body. In some cases this can be restricted entirely to the affected part. Rheumatic cases particularly enjoy them and are tempted to remain in them for a long time. They can so remain for upwards of an hour and repeat the bath daily; the fatigue is much less than with a complete bath, which is so energetic as not to bear repetition oftener than every two or three days.

To get rid of the sand which adheres with the perspiration, the bath is supplemented by friction with towels, or with brandy, or by water bathing or douches.

The characteristic of these baths is to determine a marked afflux of blood to the skin, which can be prolonged for a long time without inconvenience; so that in a general way it may be said that they are useful when it is desirable to stimulate strongly the circulatory system and thus to increase molecular change with the view of restoring the functions of the skin, and maintaining there the afflux of blood somewhat permanently (as in atrophies, paralyses, chronic rheumatism, articular rigidity, old white swellings, and the resolution of effusions).

OBSTETRICS AND GYNÆCOLOGY.

CREDE'S METHOD OF EXPRESSION OF THE PLACENTA.—In a paper which is a reply to certain objections to his method by Ahlfeld, Créde (*Abender gegen Ahlfeld's Berichte und Arbeiten, etc.*) gives a very clear description of the mode in which his method is to be carried out (Edin. *Clin. J.*). "Immediately after the birth of the child, the uterus must be controlled by the hand laid on it, and the third stage shortened in this way, that the natural contractions of the uterus are increased by gentle, soft friction by the hand, and the contractions which would otherwise be delayed are excited. As soon as the hand resting on the uterus feels a more powerful contraction, with which some blood escapes, and the uterus becomes distinctly smaller in the hand, the uterus must be grasped on all sides with the fingers of one or both hands, and with the fundus directed forwards and upwards, *gently* pressed downwards toward the hollow of the sacrum, rather towards the coccyx, *i. e.*, with the patient lying horizontal on her back—vertically downwards into the small pelvis. This pressure is only to be made during the acme of a pain." The placenta will, as a rule, be expelled with the third or fourth contraction, *i. e.*, five minutes or more after the expulsion of the child. If not expelled then we must delay expression till the contractions are renewed.

ON THE VALUE OF ALTERATIONS IN THE KIDNEY, CONSECUTIVE TO FIBROIDS OF THE UTERUS, IN THE INDICATIONS FOR AND THE PROGNOSIS OF HYSTERECTOMY. S. Pozzi, *Annales de Gynécol.* (*Medical Chronicle*) calls attention to the exceptional gravity which is sometimes given to diseases of the uterus, owing to the intimate relations of that organ with the bladder and lower end of the ureter. The uræmic affections which complicate cancer of the cervix have for a long time attracted the attention of pathologists. Serious lesions of the kidneys and ureters may be caused by simple prolapse of the uterus, owing to the interference it causes with the position and functions both of the bladder and of the lower end of the ureters. Other uterine displacements, such as retroversions and retroflexions, not infrequently occasion a certain degree of compression of the ureters, and it is easy to see that uterine myomata are quite capable of producing a still more injurious degree of pressure. The author inquires how far the kidney lesions, resulting from this pressure, affect the indications for, and prognosis of, the operation of hysterotomy. He sums up his conclusions as follows:

1. Compression of the bladder and ureters is a frequent complication of uterine fibroids, even when they are of moderate size, and is capable of inducing serious lesions of the kidneys (hydronephrosis, cysts, sclerosis, fatty degeneration).

2. When this compression affects the bladder it is readily recognized, but when it only affects the ureters it is scarcely possible to do more than arrive at a suspicion of the truth, until the appearance of albumin in the urine points to implication of the kidney.

3. Compression of the bladder or ureters ought to be regarded as a distinct indication of the need of operative interference, and may alone be sufficient to justify it.

4. In the case of hydronephrosis, the indication for operating is particularly pressing, on account of the danger which menaces the hitherto more or less sound kidney.

The treatment of these complicated cases will be rendered less formidable by dividing the operation into two parts, *i. e.*, by first performing hysterotomy, and attacking the cyst after the patient has recovered from the first operation.

5. The prognosis of hysterotomy is rendered con-

siderably more grave by the presence in the urine of albumin dependent on kidney lesion. The operation is indeed contraindicated if there be confirmed Bright's disease, but not if, as in a very interesting case detailed by the author, the quantity of albumen be only slight.

MEDICINE.

PROPHYLAXIS OF DIPHTHERIA.—The Council of Hygiene of France has voted the following instructions. (*Jour. de Med. et de Chir.*):

Instructions upon the precautions to be taken against diphtheria:

Preservative measures.—Diphtheria is a contagious affection. All association of children with persons affected by it should be interdicted. No medicine is known to-day that is protective against diphtheria. It is important, particularly during the prevalence of epidemics, to nourish children as carefully as possible, and to see that they are not subjected to the prolonged influence of moisture and cold. It is very important to attend to all throat affections at their onset.

Measures to be taken when a case of diphtheria appears in a family:

It is indispensable to remove the case at once from all communication with other persons, especially children, who are not concerned in the treatment of the disease. Those who wait upon the case should not embrace the patient, inhale the breath or stand in front of the mouth of the patient during attacks of coughing. If they have any cracks or sores on the hands or face, they should cover them carefully with collodion.

They should be well-nourished, and go out into the fresh air several time every day, taking the precaution of first washing the hands and face with water containing to the quart about three teaspoonsful of crystallized boracic acid, or fifteen grains of thymic acid. They should be careful not to remain night and day in the room with the patient.

Measures of disinfection in the course of the disease or in the case of death:

1. The matters discharged by coughing or vomiting should be destroyed with the aid of a solution containing ʒjss of chloride of zinc or sulphate of copper to the quart of water. The soiled linen, clothes, etc., should be immediately washed in one of these solutions, and then plunged into water which is kept boiling for an hour at least. The spoons, glasses, etc., after being used by the patient, should be plunged into boiling water.

2. Whatever be the result of the disease, disinfection is indispensable. Fumigations with sulphur are to be conducted as follows: After closing all openings, an earthen pan containing hot coals is to be placed upon sand, and on it powdered sulphur to be placed proportional in amount to the size of the room (20 grammes, or ʒv, to the cubic metre). The chamber must remain closed for 24 hours, and then to be freely aired. The clothes, linen and other cloths used by the patient are to be disinfected by the solutions mentioned before being sent to the wash. The mattress should be opened and left in the chamber during the fumigation.

IDIOPATHIC CONVULSIONS OF THE TONGUE.—Dr. O. Berger (Archives de Neurologie, *Jour. de Med. et de Chir.*) describes a singular affection of the tongue in a woman 28 years of age, without any particular antecedents, who was taken suddenly without prodromata, and while in very good health, with a sensation of laryngeal tension, situated immediately below the chin; when the tongue, which seemed to the patient to be so swollen as to fill the whole mouth, was affected throughout its length by an undulation. These symptoms constituted an aura which lasted a minute and a half. The organ was then irresistibly projected forward violently; it struck against the dental arches with such force as to produce a perceptible noise, or forced the tip between the lips. These rhythmic convulsions succeeded each other at the rate of fifty or sixty times per minute. Speech and deglutition are impossible during the attack, which causes no other disturbance immediate or consecutive. The duration of the attack is from one to two minutes; it is followed by fibrillary contractions, which last for several minutes. A cure was effected by the aid of tonics.

Dr. Berger cites another case, in a man 42 years of age; the same phenomena were repeated in his case, with the exception of the aura. There were brisk, involuntary and forcible projections of the tongue from the mouth many times in succession, even during the night. The patient becoming frightened, closed the jaws involuntarily and wounded the tongue frequently. No other accident occurred, and there was an absence of etiology.

Dr. Berger considered that there was a central excitation, either cortical or bulbar, of the hypoglossal nerve; it is similar to the idiopathic convulsions of the cremaster, also so inexplicable, which cause an extremely painful sensation of contraction. A cure was effected by means of injections of atropia and galvanism.

TESTS FOR ALBUMIN IN THE URINE.—Dr. Wm. Roberts, the well known authority on urinary and renal diseases, has an article on this subject in the *Medical Chronicle*, in which he premises that the urine in health contains appreciable traces of albuminoid matter of some kind. All urines contain a diastatic ferment, as shown in their power, to a low degree, of converting starch into sugar. All urines also contain mucin, and generally in sufficient quantity to be detectable by direct testing; traces of peptone and probably of other proteids. Now in testing the urine for albumin our object is to distinguish in kind and quantity the albuminoid matter which is morbid. A reagent which, like tannin, throws down every kind of albuminoid matter, even in the minutest traces, is, *ipso facto*, condemned. The new test for albumin, such as *picric acid, tungstate of soda, mercuric iodide*, and the *acidulated brine* test; all fall under this condemnation.

The most common cause of embarrassment in testing for minimal quantities of albumin is the pres-

ence of mucin in the urine. The new tests give a reaction in the mucin which is identical with that produced by albumin. Nitric acid wholly avoids this difficulty, and the boiling test avoids it almost as completely. When a urine containing both albumin and mucin is tested, by the *contact method*, adding the reagent by means of a pipette with a tapering point, with nitric acid, the albumin is thrown down just above the line of junction of the two fluids, while the mucin is brought into view towards the upper part of the column of urine, where it gradually forms a diffused haze, quite distinct from the opalescent zone at the line of junction. Sometimes the mucin haze is seen collected into a more or less distinct zone or ring which hovers toward the middle or upper part of the column of urine. When this happens a curious distinction may be observed between the two zones. The mucin zone is broken up into a diffused haze by a slight agitation, as by twirling the test tube between the fingers; but the albumen zone is remarkably steadfast, and resists unbroken a considerable amount of agitation.

When an opalescence in a specimen of urine is produced by the other tests mentioned, the observer cannot (without further testing) tell what it means; but when an opalescence is produced by nitric acid at the time of junction of the two fluids—it means albumin and nothing but albumin. For this reason nitric acid must be regarded as the albumin test best adapted for clinical work. If the observer waits fifteen to thirty minutes at the most, so as to allow time for a possible reaction to develop itself, nitric acid becomes a very sensitive test, and falls very slightly behind the most sensitive of the less reliable tests.

If it be desired to push the testing beyond the utmost sensitiveness of nitric acid, or to arrive at conclusions more rapidly, the heat test supplies the deficiency. When the heat test is performed with certain precautions, it transcends in delicacy all other albumin tests. The chief point to be attended to is the due acidulation of the urine; too much acid or two little acid equally vitiates the delicacy of the reaction. A test tube is charged with about three drachms (10 c.c.) of urine, and to this is added a single drop of acetic acid (B. P.). The upper half of the column is then heated to boiling. If albumin is present, even in minimal quantity, the upper boiled portion of the column will show opalescence, in contrast with the lowest half, which remains unchanged. If the urine be alkaline, it should first be carefully neutralized by adding successive drops of acetic acid until the litmus paper shows a distinct but slight acidity, and then the final single drop of acid is added before boiling. Even if the urine possess its natural acidity, it is better to add a drop of acetic acid if you want to bring out the maximum sensitiveness of the boiling test. The mucin reaction is to a slight degree intensified by heat, but only interferes in the case of a urine containing much mucin with a trace of albumin. When the mucin haze is very pronounced and rapidly developed, the quantity of mucin present is sufficient to lower slightly the value of the boiling test. When this is the case, Dr. Roberts adds to the urine a fourth of its bulk of a saturated solution of common salt. This addition prevents the development of a mucin reaction on boiling, but does not interfere in the least with the albumen reaction.

A mixture of one volume of strong nitric acid with five volumes of a saturated solution of sulphate of magnesia makes an admirable albumin test. It forms a water-clear solution, which does not fume, nor stain nor burn the fingers, or garments. Its specific gravity is 1–440, so that it sinks with rapidity through a column of urine in a test tube, and is suitable for testing by the contact method. It is distinctly more prompt and sensitive as a test than the pure acid, and its action in regard to albumin, mucin and peptone is similar. It acts less strongly than the pure acid on the coloring matter of the urine, and is not prone to cause disengagement of gas from destruction of uric acid. One of its recommendations is that it can be carried about in a corked bottle with considerable less risk of a catastrophe to skin and garment than the strong acid.

THE DRY DIET TREATMENT OF ULCER OF THE STOMACH.—M. Debove in *Le Progres Medical* points out certain risks in the ordinary milk treatment of ulcer of the stomach: The ingestion of so much fluid, viz.: five to seven pints of milk in the twenty-four hours, into a stomach with atonic mucous membrane is apt to produce almost fatal dilatation, and the stretching of the ulcer to provoke hæmorrhage and perforation. Indeed, all excessive dilatation of the stomach is dangerous, while contraction is favorable. M. Bouchard for a long time in this disease has given a dry diet, consisting of finely divided nutritious food—such as meat powders—with not more than three-quarters of a part of pure water during the twenty-four hours, and under this regimen he has seen the morbid dilatation of the stomach diminish or disappear. M. Debove's plan is as follows: The stomach is first carefully washed out, but the operation is to be instantly stopped if the returning liquid is tinged with blood. Then the patient is to take three meals daily, each consisting of meat powder twenty-five grammes, bicarb. of soda ten grammes, and, as the mixture is not very palatable, it is well to introduce it into the stomach by a siphon. To this dry food which represents 300 grammes (about ten ounces) and 30 grammes (about one ounce) of sod. bicarb. per diem, one litre (nearly a quart) of milk is added, which is to be drunk in small quantities at a time. M. Debove's object is to annul the action of the gastric juice, and thus stop digestion and favor the healing of the ulcer.

The albuminoids are not converted into peptones in the stomach, and their alkaline reaction is very favorable to their digestion in the intestine. Perhaps, too, the soda is *directly* beneficial to the ulcer. Two severe cases of gastric ulcer, accompanied with very painful crises, by hæmorrhage, and by great emaciation, which had resisted all treatment, were quickly cured by the above treatment of Dr. Debove.—*Medical Chronicle.*

THE
Journal of American Medical Association.

PUBLISHED WEEKLY.

THE EDITOR of this JOURNAL would be glad to receive any items of general interest in regard to local events, or matters that it is desirable to call to the attention of the profession. Letters written for publication or containing items of information, should be accompanied by the writer's full name and address, although not necessarily to be published. All communications in regard to editorial work should be addressed to the Editor.

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Address

JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION,
No. 65 RANDOLPH STREET,
CHICAGO, ILLINOIS.

SATURDAY, NOVEMBER 8, 1884.

MICROBES AND SUPPURATION.—In a previous editorial we called attention to the experiments of Mr. Cheyne on the production of suppuration by bacteria. Since that time he has made two further reports upon the same subject. Incidentally he has elicited several interesting facts.

In order to test the degree of virulence when grown away from oxygen; in addition to the experiments described in our former editorial upon the growth of micrococci in eggs, Mr. Cheyne cultivated them in various gasses.

He found, contrary to the views of Dr. Ogston, that they grew best in oxygen gas, next in air, and feebly and slowly in hydrogen and carbonic acid gas.

The virulence of the micrococci did not seem to be materially modified by the atmosphere to which they were subjected.

Another point of interest elicited by one series of inoculation experiments, was the fact that the micrococci appeared to be eliminated from the blood through the kidneys. They were injected directly into the veins of the rabbit. When three-quarters of a cubic centimetre or less of the fluid in which the micrococci were growing was injected, death did not occur, but larger amounts were fatal.

In one series of experiments with micrococci obtained originally from pus taken from a case of incision of the knee joint, micrococci were found only in the kidney of the rabbits into which the cultivation fluid had been injected. The most careful search did not show them in the blood, or any other internal organ except the kidney.

The lesions in this organ consisted in masses of micrococci, and of inflammatory infiltrate around them. These lesions were very numerous in the pyramids and less toward the junction of medullary and cortical substance, and rare in the cortex itself. The first effect of the mass of micrococci is the destruction of the tissue immediately around it. Therefore on staining these specimens the micrococci appear deeply stained; around them is a white ring, and outside of this a ring of inflammatory exudate.

After a time the micrococci spread from the centre into the clear ring, and the leucocytes from without inward. Finally the mass of organisms is completely broken up and is replaced by leucocytes. The micrococci by degrees disappear entirely; the white cells become absorbed or organize fibrous tissue.

It was difficult to determine whether the masses of micrococci formed in the uriniferous tubules or blood-vessels. Mr. Cheyne believes, however, that in the great majority of cases they formed in the tubules, although possibly some of earlier formation may have been in the blood-vessels.

In another series of experiments, made with micrococci taken from wound made in excision of the breast, after cultivation and injection into the veins they were found as plugs in the kidneys, walls of the heart, liver, lungs and spleen. The micrococci in the kidneys were in the blood-vessels, not in the uriniferous tubules.

Thus we see that when micrococci of pure cultivations are injected into the veins of animals different results follow, depending upon the source, or more probably the nature of the microbe.

Another conclusion which Mr. Cheyne draws from these experiments is, that "organisms not capable of growing in the blood may yet produce serious results by growing in the excretory canals."

Dr. Ogston has asserted that all suppuration is produced by microbes, except in cases of burns or blisters. Mr. Cheyne admits that micrococci are always found in acute abscesses, and are probably the cause of the suppuration, although perhaps not the primary cause of the inflammation. Still he shows that suppuration can be produced without the agency of these bodies.

The most conclusive experiments upon this point were made by placing within a thin glass tube a sterilized mixture of olive and croton oil. The tube was then sealed and inserted into the muscular tissues of an animal, under the strictest antiseptic precautions. The incision which was made was allowed to heal, when the tube was broken, thus permitting the irritating contents to escape into the tissues. Abscesses were formed containing pus, but no microbes.

At the time the oil-tube was inserted into the tissues, sterilized meat infusions were inoculated with the same sterilized oil mixture. In these, also, no micrococci developed.

These papers of Mr. Cheyne are interesting, both on account of the value of his own experiments, which we have briefly described, and for the conclusions which he adduces both from them and the work of others.

HYDROCHLORIDE OF COCAINE — A LOCAL ANÆSTHETIC FOR MUCOUS AND SUBMUCOUS SURFACES.— The news wafted across the water from the Ophthalmological Congress in September last by Dr. H. D. Noyes, of New York, of the remarkable powers of the hydrochloride of cocaine as an anæsthetic to the mucous and subjacent tissues of the eye, has excited the attention of physicians all through the country. The information sent to the *Medical Record* by Dr. Noyes was in substance as follows: Dr. Koller (Dr. Lucien Howe, in his letter to the *American Jour. of Ophthalmology*, calls him Dr. Carl Carson), of Vienna, gave to Dr. Brettauer, of Trieste, a 2 per cent. solution of hydrochloric of cocaine for exhibition as a local anæsthetic for the eye. He had only lately become acquainted with its properties relative to the eye, and began his observations from a knowledge of its anæsthetic influence on the vocal cords. The solution was used before the Ophthalmological Congress, and after the instillation of two drops of a 2 per cent. solution at an interval of ten minutes, the cornea, which was previous to the use of the solution of normal sensitiveness, could now be touched and even indented without any complaint of pain. Moreover, a speculum was introduced, the lids distended, the conjunctiva seized with the forceps, and the eye moved in any direction without any complaint whatever.

No sooner was this news received than active workers were eager to utilize its qualities, and with the exception of two reporters in the *British Medical Journal*, the record hitherto attributes to it such virtues that it promises to practically obliterate the use of ether from the ophthalmic surgeon's practice, except in cases in which the education has been so deficient that the patient screams at the sight of an instrument. To counterbalance the testimony of the two reporters in the *British Medical Journal* referred to above, it should be added that Mr. Nettleship, ophthalmologist at St. Thomas's Hospital, and of great experience, reports the most complete success with its use; and in New York, Drs. Agnew, Moore, Minor and Knapp, as well as several others through the conntry, have all put it to the test by performing under its influence the various operations of extraction, tenotomy, removal of pterygium, etc., etc., with the most gratifying results. A 4 per cent. solution seems to be preferred to the 2 per cent.

With such a sudden revelation of remarkable and useful properties we naturally turn to literature and memory for some of the foreshadowings of its approach. We are told by Dr. E. R. Squibb that cocaine, although differing chemically from caffeine and theine, produces similar physiological effects, but that the cocaine is about six and a half times as strong,[1] but whether this new application of the properties of cocaine will modify his views or not will, we have no doubt, be revealed later. The common conviction among the laity of the value of tea as an application to the eye may lead us to suppose that even in this question of anæsthesia the similarity of the physiological effects may hold good. Stillé and Maisch say: Tea is applied in China as a wash to the eyes, ulcers and wounds of all kinds, and Lettsom is said to have shown that the volatile substance which may be distilled from an infusion of tea was capable of "paralyzing the hinder legs of the frog."

Robertson says, in his Eléments de Thérapeutique et de Pharmacologie, published in 1877, when a good quality of coca leaves are chewed one realizes a certain anæsthesia of the tongue and buccal surfaces. He further explains the well authenticated capacity of those who use the coca leaves habitually, to endure hunger, as arising from the anæsthesic condition of the mucous surfaces which unanæsthetized are the seat of the pain of unappeased hunger. His observations were made on a student of his in R's laboratory. The experiments of Mr. Dowdeswell in the physiological laboratory of University College, London, more or less contradict these statements, but the probability is that Mr. Dowdeswell worked upon very inferior samples of leaves. Indeed, Dr. Squibb has lately ceased to make the fluid extract simply because it was impossible to get a creditable article in the market. This is deplorable when we consider the large amount which is annually disposed of. In 1877 Rabuteau says that the annual amount of money exchanged for coca leaves was about 25,000,000 francs; and Dr. Squibb says that at present it amounts to $10,000,000, the amount by weight being 40,000,000 pounds.

The average yield of cocaine from the leaves of good quality seems, from the observations collated and made by Dr. Squibb, to be about 0.25 per cent. All the reports hitherto seem to speak of the substance

[1] Ephemeris, July, 1884, p. 605.

used as a definite hydrochloride or muriate of cocaine. It would seem, however, from the way in which it is used, to be questionable whether the salt is in solution as a definite hydrochloride or not.

Rabuteau says: The action of acids on the alkaloid cocaine is somewhat complicated; for according to Loessen hydrochloric acid decomposes it and develops from it benzoic acid and eczonine, and that with the latter base the hydrochloric acid forms a salt. Stillé and Maisch say cocaine when prime, is in colorless prisms of a strong alkaline reaction, has a bitterish taste, produces a transient numbness on the tongue, and dissolves in 704 parts of water and in much less alcohol and ether. They also say that strong hydrochloric acid decomposes it into methylic alcohol, benzoic acid and eczonine. Squibb in his investigations speaks of the cocaine as a greenish oily substance in which there was no appearance of a crystallized alkaloid. A sample of the solution in use which we have had the pleasure of seeing, gave on evaporation no sign of crystallization but presented the appearance rather of a gum.

The testimony in favor of its use as an anæsthetic for mucous surfaces is so great that its field of usefulness will certainly extend far beyond the domain of ophthalmic surgery, and the consequent demand will probably stimulate the producers to more care both in cultivation and transport.

American Public Health Association. — The third day of the recent annual meeting of this Association in St. Louis was occupied chiefly in listening to papers on Cattle Diseases, and especially on "Texas Cattle Fever," by Dr. W. B. Conery, of Missouri, and Dr. A. M. Partridge, of Indiana; on Malaria Protectives, by Dr. G. B. Thornton, of Tennessee; on The Importance of Water Analyses, both Chemical and Microscopical, by Dr. Charles Smart, of the U. S. Army, and Thad. M. Stevens, of Indiana; on The Pollution of the Waters of the Upper Ohio, by Dr. J. E. Reeves, of West Virginia (which may be found in full in this number of the Journal); on The Relation of Depth of Water in Wells to the Causation of Typhoid Fever, by Dr. H. B. Baker, of Michigan; and The Use of Polluted Well Water in the Manufacture of Soda Water in St. Louis, by Dr. Frank R. Rye, of Missouri; on The Disposal of Sewage, by Dr. S. S. Herrick, of Louisiana, and Dr. W. J. Harris, of Missouri; on Disease Germs, by Dr. Geo. M. Sternberg, of the U. S. Army; and on The Bearing of the Discovery of the Tubercle Bacillus on the Public Health, by Dr. L. Bremer, of Missouri.

All these papers contained some matter of value, and especially those of Drs. Thornton and Sternberg, yet we have been able to cull but little that is not already familiar to the readers of the Journal. On the fourth and last day of the meeting the attendance of members was very small. Some time was devoted to the transaction of miscellaneous business, and some additional papers were read.

Officers Elected.—The Advisory Council recommended that the following gentlemen be elected officers of the Association for the year: Dr. James E. Reeves, of West Virginia, President; Hon. Erastus Brooks, of New York, and Dr. Henry B. Baker, of Michigan, Vice-Presidents; Dr. J. B. Lindsley, of Tennessee, Treasurer; Dr. H. P. Walcott, of Massachusetts, Dr. Charles Smart, of the United States Army, Dr. Geo. B. Thornton, of Tennessee, Dr. D. W. Hand, of Minnesota, Dr. Gustavus Derron, of Louisiana, and Dr. H. B. Holbeck, of South Carolina, Executive Committee. The Council further recommended that the next Conference of the Association be held at Washington in December, 1885, and that the thanks of the Association be tendered to the Government of the Dominion of Canada and the Ontario Board of Health for their kind invitation to hold the next meeting in Toronto, and that the Secretary be instructed to decline the invitation. The Conference unanimously approved of the recommendations of the Council.

An Advisory Council of one from each State was also appointed, and after adopting the usual complimentary resolutions the Association adjourned. Although the attendance of members during the annual meeting was not as large as we had anticipated, the papers read and all the discussions related more exclusively to the appropriate objects of the Association than at previous meetings, and the result will be a material advancement of the public health interests, and the promotion of greater harmony among the workers in that field throughout the whole country. The municipal authorities, citizens and profession of St. Louis deserve much credit for the liberal hospitalities extended by them to the members of the Association during the week of their sojourn in that city.

The Pullman System of Epuration of Sewerage.—Having received several inquiries in regard to the details of the system of sewerage and epuration in operation at Pullman in the vicinity of this city, we answer as follows: The population of the town is

about 8,000. The sewerage matter is received into a system of deep laid sewers through which it is conducted into a large cesspool, from which it is pumped through a large cast iron pipe to the farm, a distance of 15,500 feet (about three miles), where it is received into a tank, screened through ½ inch screen to separate out the coarser matter contained in it. From the tank it is distributed over the farm through clay pipes laid four feet below the surface, with hydrants every 400 feet to carry it to the surface over which it is allowed to flow.

The farm has 140 acres capable of being irrigated through these pipes and hydrants, and takes care of the whole sewerage of the town with ease and profit.

CHOLERA INVESTIGATIONS.—A recent report of the French Commission for investigating the nature of cholera in Marseilles, shows an entire failure to produce cholera in rabbits or other animals by a great variety of experiments with the comma-bacilli, both as found in the intestines of cholera patients and by cultivation, and consequently it affirms the non-contagiousness of that disease.

The report describes a peculiar condition of many of the blood-copuscles, which the Commission regard as the essential pathological condition in epidemic cholera.

OVARIOTOMY WITH EXTIRPATION OF ONE KIDNEY.—We are informed that on Monday, Oct. 26, in presence of the medical class at Ann Arbor and a number of medical practitioners, Prof. Donald Maclean, of Detroit, extirpated the left kidney, both the ovaries and a large piece of the omentum from a married woman 27 years of age, who proved to be in an early stage of pregnancy.

So far, now one full week, the patient has done well, and the case promises to be a complete success. The kidney and both the ovaries were cystic, the former being very large.

MUNIFICENT BEQUEST.—The late Countess Bose, of Cassel, by her will made a legacy of $190,000 to the University of Berlin, for the benefit of poor students of medicine.

DR. LOUIS A. DUGAS, one of the most learned and eminent physicians of Georgia, died at his home in Augusta, on the 19th ult., at the ripe age of 78 years.

STATE MEDICINE.

PRACTICAL RECOMMENDATIONS FOR THE EXCLUSION AND PREVENTION OF ASIATIC CHOLERA.

BY JOHN H. RAUCH, M.D.,
Secretary Illinois State Board of Health.

Presented to the Conference of State Boards of Health in St. Louis, Oct. 13, 1884.

MR. CHAIRMAN:

A grave responsibility rests upon those charged with the protection of the public health at the present time. For the past six years—ever since the memorable fever-summer of 1878—the country has been free from any serious and widespread epidemic disease. Small-pox, which prevailed from 1880 to 1883, has been successfully combated, and its ravages confined to proportions which are insignificant when compared with many other epidemics. Hundreds of thousands of unprotected immigrants were landed on our shores during those four years; but the Immigrant-Inspection Service, inaugurated in the spring of 1882, thenceforth rendered them comparatively harmless, by securing an improvement in their sanitary status through the effect of the Service upon the work of steamship surgeons during the voyage, and upon the methods at quarantine on arrival; as well as by its own sanitary surveillance of the immigrants from the port of arrival to the point of ultimate destination or distribution in the great interior—such surveillance consisting of repeated inspections, vaccination of the unprotected, systematic observation of suspicious sickness, prompt isolation of discovered small-pox or other contagious disease, and the enforcement of the measures necessary to prevent its further spread. Among our own people outbreaks of the disease were promptly suppressed wherever sanitary authority had control, and well-defined methods of dealing with the contagion were enforced. On the other hand, while we have fought small-pox and conquered it, we have been spared from any serious conflict with yellow fever. Nor have other diseases prevailed to an unusual extent, as they so often do in the absence of an epidemic. On the contrary, the average annual death-rate has been low, and during the past year remarkably so.

This very fact should be, in itself, a warning to the sanitarian. It means a survival of a large number of persons who would have been carried off had the non-epidemic diseases maintained their usual severity. It means the accumulation of susceptible material ready for the prey of epidemic contagion, whenever such contagion shall be introduced under conditions favoring its propagation and spread. It is one of the most important factors in determining the extent and severity of the next epidemic, whatever that may be and whenever it may visit us.

But, for a period of six years, sanitary effort and sanitary authority have had no unusual demand made upon them, or at least no demand which the public recognizes as unusual. And during these six years the interest in sanitary matters which was aroused by the epidemic of 1878, and which, among other causes,

led to the formation of many of the present State Boards of Health, and to the creation of the National Board, has gradually diminished as the memory of the epidemic faded away, or was displaced by other and newer topics and occurrences.

One of the chief reasons why sanitary work fails to receive continuous and adequate consideration and support from the public and from the legislator, is that, in its very essence, it is a work of prevention; and just in proportion to its own success and thoroughness does it destroy the obvious and palpable reasons for its continuance. When an epidemic actually exists, and industry and commerce are paralyzed in its presence, and the death-roll swells from day to day, there is then no question in the public mind about the desirability of sanitation, no hesitation as to making appropriations for its support, or enacting legislation to increase its efficiency.

But Rabelais told us, nearly four hundred years ago, what always happens whenever the devil gets well. And Congress adjourned its last session, not only without doing anything additional for the protection of the public health, but after substantially annulling and rendering inoperative the only national legislation of any real value which we possessed.

However, there is a revival of public interest in these matters within the past few months, due to the spread of Asiatic cholera in Southern Europe; and it is our present duty, as sanitary officials, to utilize and direct that interest to the securing of adequate legislation and intelligent action for the prevention of the introduction of the pestilence to our shores, and its limitation, should it unfortunately effect an entrance. Much has already been done in the latter direction, by the action of State and local health authorities in pushing the sanitary education of the people through circulars, memoranda and other modes of appeal. Since the second of July last such circulars from sixteen States and from the Dominion of Canada have already come under my notice. In many instances, sanitary inspections of municipalities, public institutions, jails, almshouses and kindred establishments, have been ordered and carried out, with the view of securing the abatement of nuisances and remedying defects in the sanitary conditions thence disclosed. An amount of sanitary work has been thus already accomplished which, aside from any consideration of cholera, will be of great value in reducing sickness and mortality from the entire list of diseases which are caused or favored by filth and other unsanitary conditions. As a recent number of the New York *Medical Record* says: "There is no doubt that the extra cleanliness produced by the cholera scare will effect a saving of life from other filth diseases far in excess of the mortality from the cholera itself, unless, indeed, it should spread beyond all expectation."

This work should be continued, and the measures which have already been inaugurated, looking to improvement in general and local sanitation, should be pushed with unabated vigor during the favorable weather we may yet have; and they should be resumed with redoubled energy whenever climatic conditions permit. It is not necessary to go into details as to this work; we are familiar with its requirements and its necessity. It is a work of continuous interest and importance, whether cholera should come or not.

With theories and speculation as to the causation of cholera, or as to its mode of diffusion and epidemic spread in the countries of the old world, this conference is not concerned. It is enough for us to know, as the basis of our action, and the foundation for practical recommendations and advice, that the disease is not indigenous to this continent; that it is an exotic, and has never yet visited us except by importation, and that only after ample warning.

It may be entirely true that, if all our food supplies were wholesome, and our water-supplies not only unpolluted but unpollutable; if sewage and refuse disposal were prompt and complete; if our cities, towns and villages were all models of sanitary perfection, and their inhabitants free from predisposition or susceptibility, acquired or inherited—in short, that if there were no ignorance, nor poverty, nor filth, nor infirmity in the land, we might dispense with precautions against the introduction of disease.

But the sanitary millenium is not yet, and we are hardly likely to witness its advent before next spring or summer, no matter how earnestly we may labor for it. So, for the present, at least, as a practical sanitarian accustomed to deal with conditions as they actually exist, I think the wise thing to do in respect of cholera is to resist the first beginnings—*obsta principiis*.

It is no doubt well to be prepared to expel the midnight burglar from one's dwelling; it is better to keep him out by locks and bolts and watchful patrols. If people must live among combustible material it is a prudent thing to forbid smoking on the premises, and to be careful about matches and other incendiary agencies, the contagion or contact of which may kindle a conflagration.

Until we can very materially change the conditions which cause considerably over one-half the annual mortality, it is our simple duty to adopt whatever measures promise a fair degree of success in excluding the foreign epidemics. Such typical filth-diseases as typhoid fever and diphtheria carry off sixty odd thousand people every year; and during the census year ten principal groups of more or less preventable diseases caused over 470,000 out of the total 756,000 deaths in the United States.

With such a showing it is simply nonsense to talk about relying upon sanitary measures alone to combat a disease like cholera. Let us push sanitation by every means in our power, and to the fullest extent. Not, however, with any hope that we can effect such a sanitary revolution in a few months as would prevent cholera, if once introduced, from spreading as an epidemic in hundreds of localities, but rather in the knowledge that every sanitary reform tells permanently and continuously on the whole body of preventable diseases; and that to the extent and measure of such reforms are the conditions made more favorable for the exclusion and prevention of all epidemics.

That cholera *will* come, it is our duty to assume. Mindful of the history of every previous cholera epidemic, we must accept as beyond a doubt—if ex-

perience is worth anything—the certainty that the disease will be brought to our shores. It always has come, sooner or later, whenever, since 1832, the contagion has obtained such a foothold in Europe as it now has.

Sooner or later, it is sure to come, and we cannot tell how soon. Cholera was brought to Marseilles in the early part of June, 1865, from Bombay via Mecca, by pilgrim-steamers conveying Algerine pilgrims returning home from the feast of sacrifices at the "holy city," and spread so rapidly that, during the month of October, it caused between four and five thousand deaths in Paris. On the 12th of that month the steamer Atalanta left Havre with over 600 cabin and steerage passengers, all of whom had been in Paris, and on her arrival in New York bay she had had 102 cases of cholera and 23 deaths. So that the disease was brought from its endemic home in India, by way of Mecca, Marseilles, Paris and Havre, to New York in less than nine months.

It is probable that we do not know how widely spread the disease is upon the continent, nor what places and ports are infected. The London *Lancet* recently stated that it has transpired that there were deaths from Asiatic cholera in Marseilles during 1883, and Dr. Albert Drysdale, health officer at Mentone, writes to that journal corroborating the statement from his own personal observation, having been taken to see a case in October, 1883, by a medical friend. Attendants, nurses, and all others cognizant of the facts were sworn to secrecy. Still more recently French naval officers have frankly stated that cholera existed on their vessels at Toulon long before the fact was made known last spring. In 1873 the existence of cholera was concealed in Austria on account of the great Vienna Exposition, and although the disease is now known to have been spreading from place to place from early in the spring, it was not until midsummer that any warning was sounded of an epidemic which caused 240,000 deaths in the Austrian dominions alone.

I repeat that we may not know how widely spread the disease now is on the European continent, and that we do not know how soon its arrival on our own shores may be announced. It is not probable, however, that it will reach us before next spring, and we may pretty safely count on some months yet in which to push our preparations to meet it and to resist its advance.

I began my remarks with the statement that a grave responsibility rests upon the sanitarian at the present juncture; but there is an equally weighty obligation resting upon the public and upon our legislators. I undertake to say, as a sanitary official of nearly 25 years' experience in the practical administration of sanitary matters in city, State and nation, and after more than a third of a century of study and observation of the disease, beginning in 1850—that Asiatic cholera may be practically excluded from the United States: That it is preëminently a quarantinable disease. That, with a judicious employment of agencies which have already been tested, Asiatic cholera may be quite as successfully dealt with in this country as small-pox, and probably more so than yellow fever.

Whether cholera shall be excluded—whether the means and agencies necessary to deal with it shall be supplied—are questions which the public must answer through their representatives in Congress, in State legislatures, and in their municipal councils; and I propose in the remaining portion of these remarks to endeavor to point out what means and agencies are necessary to the end in view; premising that, in their consideration, it should be remembered that sanitary science is comparatively modern; that the sanitary organizations of the present day had no existence in the days of the great epidemic visitations of cholera in this country; that within the past few years there has been a rapid and wide-spread diffusion of sanitary knowledge among the people; and that, even so lately as the last cholera epidemic in the United States, that of 1873, no organized effort was made to prevent the importation of the disease, and practically little or nothing done to prevent its extension; certainly, no such measures have ever been employed, either to prevent its introduction or to limit its spread, as we have recently successfully employed against small-pox and yellow fever.

Asiatic cholera—so far as this country is concerned—is preëminently a quarantinable disease. Unlike the virus of small-pox, unlike the poison of yellow fever, the morbific potency of the cause of Asiatic cholera—whatever that cause may be—is sharply limited as to duration. Failing to find suitable conditions for its growth and reproduction it *dies out*. No single case, no single shipload of cases ever succeeded in establishing an epidemic in this country. I know this is contrary to the received opinion and popular belief; but I ask you to follow me in a brief resumé of the facts concerning each epidemic, beginning with 1832. That epidemic is attributed to the ship Carrick, which arrived at the Grosse Island quarantine station in the St. Lawrence river on the 3d day of June, 1832. But six days before that, the ship Elizabeth had arrived with 200 immigrants on board, and having had 20 cholera deaths during the voyage. Fourteen days before the Elizabeth the Robert had arrived, with 10 cholera deaths; and sixteen days before the Robert—that is on the 28th of April, 36 days before the arrival of the Carrick—the ship Constantia arrived, having had 29 cholera deaths during the voyage. These are all known to have been cholera-infected vessels, and their hundreds of passengers were known to be cholera-carriers; but these passengers are only a small fraction of the 30,000 immigrants who arrived in the St. Lawrence during the spring and early summer of 1832, from the same infected localities and sailing from the same infected ports as the passengers of the Constantia, the Robert, the Elizabeth, and the Carrick. And yet they failed to develop a single case in Canada or elsewhere until the 8th day of June. The introduction of the disease into New York is attributed to Canada; but the same class of immigrants from the same localities in Europe, were arriving in New York during the spring of 1832, as those in the St. Lawrence. And yet no case of the disease occurred in the city or vicinity until June 13.

In 1848, the noted cases of the New York and the

Swanton occurred—the former carrying cholera into New York, the latter into New Orleans; and to them is attributed the epidemic which, in the two succeeding years, spread from the Atlantic to the Pacific and from Canada to the gulf. But the importation by the New York, though causing fifty deaths at quarantine, resulted in only two cases in New York city, and it was not for months afterwards—not until the 11th day of May, 1849, and after the arrival of several other ships with cholera on board, that the first case appeared in the city, and the disease began to spread from that point. On the other hand, immigration from cholera-infected districts of Europe into New Orleans had been continuous for months before the arrival of the Swanton—the two vessels immediately preceding her, viz.: the Gutenberg and the Callao, having lost 25 passengers from cholera.

From this time until the close of what is generally known as the epidemic of 1854, but which was really only a continuation of the epidemic of 1848–49, there were continual importations of cholera-carriers, either in the persons of those who had been exposed, or in cholera-infected articles; in November, 1853, for example, no less than 28 vessels, on which 1,141 persons had died of cholera, arrived at the port of New York alone.

The case of the Atalanta, in 1865, has already been noted; but it should be further observed that there were three other arrivals from Havre soon after, and on the last two of these there were deaths from cholera during the voyage, but the disease got no nearer the city than Ward's island, and by the 20th of December had entirely ceased. In 1866, cholera was carried into Halifax by the steamer England, which vessel afterwards proceeded to New York, where, on the 20th of April, she landed 891 passengers and 116 officers and men, having lost 316 by cholera. There were eight cases and five deaths among those who had to do with the vessel at Halifax, but no other extension of the disease, and none in New York. Two days prior to the arrival of the England, the Virginia had arrived at New York quarantine, having had 116 deaths on the voyage; and before the first death of the epidemic of 1866 had occurred, namely, May 2, there had been nearly 3,000 arrivals in New York of individuals "who had been directly exposed to the infection of cholera at Liverpool, on shipboard, and at quarantine." Notwithstanding this, so slowly does cholera spread, except under favorable conditions, that there had been only 21 deaths from the disease up to July 8; and it was not until the first week in July that the disease appeared in Brooklyn, although there were frequent arrivals of cholera vessels during all this time.

The epidemic of 1873 was preceded—*fourteen months before the first case of the epidemic occurred*—by the arrival of the Franklin at Halifax, November 6, 1871, in distress, having lost 28 of her steerage passengers by cholera. Five cases, with three deaths, resulted from her on shore, but the disease did not spread, either in Halifax or vicinity. The vessel proceeded to New York, where she arrived November 12, 1871, having lost 11 more of her passengers, and having 72 cases then on board. But no epidemic followed. During 1872 there were numerous arrivals from cholera-infected ports, and the disease appeared on the island of Cuba and in Jamaica in the autumn of that year. During December, 1872, and January, 1873, there arrived in New Orleans a total of nearly 2,000 immigrants from cholera-infected districts of Europe. And yet it was not until the 9th day of February, 1873, that the initial case of this epidemic occurred in the city of New Orleans.

No single case of cholera, no one shipload of cases has ever yet sufficed to establish an epidemic of Asiatic cholera on this continent. It has only been after repeated importations of the contagion in the persons of thousands of immigrants and in their infected baggage and household goods, that it has effected a lodgment, and has reproduced itself and multiplied into an active epidemic agency.

Hence my first proposition, that, for this country, the disease is essentially and preëminently a quarantinable disease, and may be practically excluded. If it were true of the cholera poison, as it is of the smallpox contagion, that favorable conditions for its spread exist wherever a susceptible individual is found, without reference to the sanitary surroundings, we should have no such history as I have just recited,—a history of repeated importations extending over months and months before it succeeded in establishing itself.

It will not do, however, to construe this tardy establishment of the contagion into an excuse for delaying measures of preparation—neither those for its exclusion, nor those for its limitation and suppression, should we fail to exclude it. Cholera is a capricious disease, and the history of its various pandemic extensions throughout the Old World affords occasional instances of a single introduction sufficing to inaugurate an epidemic. Fortunately, the same conditions do not, generally, obtain with us, except in a few localities. Populations are not so dense, nor are dwellings so saturated with crowd-poison, nor is the soil so thoroughly polluted by long occupancy. Where these evils exist they should be remedied forthwith to as great an extent as practicable, in order that, among other good results, the conditions favorable for the growth and multiplication of the cholera-poison may be destroyed or limited.

It is charged that quarantine is powerless to prevent the extension of epidemic diseases; that, in the language of John Simon, "a quarantine which is ineffective is a mere irrational derangement of commerce;" and that to be effective, it must be of such a nature as to absolutely prevent all intercourse with the infected country. All this may be true of Great Britain, owing to her geographical position, to her extensive commerce and its exigencies, to her dependence on other countries for her food supply, and to other conditions which do not obtain with us. It may also be true of Europe generally. There a narrow strait or sea, a river, a mountain chain, or merely a territorial boundary line, with its custom houses and passport system, defines the limits to be guarded, and forms the only physical barrier between the quarantiner and the quarantined. Here, the whole width of the Atlantic intervenes between us and the infected country. There, cordons and

quarantines mean privation, misery and suffering, and, ultimately, starvation. Here, the nation is self-supporting, and could exist unaffected in almost all her material interests. There, it may be true, as alleged, that a quarantine of exclusion is impossible of execution, and that the attempt to maintain it does more harm than good, in leading to numberless contraband practices by which the disease may be introduced in unsuspected ways.

None of this is true when applied to the exclusion of Asiatic cholera from this country; while to accept the statements unquestioned would cause vigilance to be relaxed, would invite contagion to our shores unimpeded, and would finally throw upon individual communities the burden and the responsibility of fighting the disease at an immense disadvantage—that is, of fighting it at home and from many quarters, instead of on the outer lines and from only one direction.

With the necessary agencies of an effective quarantine provided in due season, it would not require any very great degree of courage to promise the practical exclusion of the disease.

These necessary agencies may be thus stated in their natural order of sequence:

First.—Timely and trustworthy information of the existence of the disease in countries and at ports having commercial relations with our own, including telegraphic advices of the departure of vessels from such ports for ports in this country. Section 1752 of the Revised Statutes of the United States gives the President authority to use all diplomatic and consular officers for "the communication of information * * * conducive to the public interests;" and instructions have already been issued under this authority.

To properly utilize this information, in fact, in order to fully secure the information, there needs to be—

Second.—A national health organization, representing the natural sanitary divisions of the country; endowed with adequate authority; supplied with means commensurate with the duties imposed upon it; and with the power to call upon any other branch of the public service of the United States for legitimate assistance and coöperation. With some modifications the present National Board of Health would satisfactorily meet this indication. In my judgment its membership should be enlarged so as to more perfectly represent the natural sanitary areas, and its members should be familiar not alone with the sanitary features of their respective districts, but equally they should be identified with the commercial, business and industrial interests.

Under this national health organization there should be extended and perfected—

Third.—The system of Refuge Stations projected by the National Board of Health. With two or three exceptions, no port in the United States has adequate facilities for the proper administration of quarantine. Such a system as was inaugurated by the National Board of Health, and which is the only quarantine contemplated in these remarks, involves the removal of an infected or suspected vessel out of the track of commerce; the segregation of her sick from the well; the proper care and shelter of both these classes; the necessary disinfection of infected cargo, and the purification of the vessel; and the release of vessel, cargo and persons so soon as they have been rendered safe and free from the danger of communicating disease.

This is very different from a mere quarantine of detention. It is the American quarantine of sanitation, a common-sense quarantine, which aims to prevent the introduction and extension of contagion, not by merely arresting it at a given point and there leaving sick and well at its mercy until, the susceptible material having become exhausted, no more cases of the given disease occur; but by removing the susceptible at once from its influence, and then destroying it and the conditions necessary for its existence by scientific methods of disinfection and purification.

To do this, however, requires a quarantine plant and facilities far beyond the means of any but the largest ports, supported either by abundant quarantine fees or by adequate appropriations from the State or municipality. But cholera may obtain access at a small port as well as at a large one, and hence the necessity for the Refuge Stations above indicated.

Under the system here outlined the departure of a vessel from a cholera-infected port would be at once cabled to the national health officer; the authority at the port of destination would be duly notified; pilots for such port would be ordered to take the vessel to the nearest Refuge Station; and at such station, under the charge of a national officer, and at the expense of the national government, she would be so treated as to make it impossible that she could land cholera-contagion in our midst.

So much for the measures which should be adopted for the exclusion of the disease—measures which have already been practically tested sufficiently to demonstrate their feasibility and value. But before dismissing this branch of the subject it will be well to consider the possibility that it may be necessary to absolutely prohibit immigration, for a time at least, from infected countries. Every one of our cholera epidemics has been directly and unmistakably traceable to the arrival of immigrants infected in person or in baggage and household goods. It was the crowded troop-ship and transport which brought the contagion into France from China and Egypt. It is the crowded pilgrim-steamer and passenger vessel which carries it from Bombay and Calcutta into Europe and elsewhere, as already instanced. It is the steerage of the immigrant vessel, with its crowd-poison and other conditions favorable to the development of a specific contagion, which we have to fear. This contingency is one of the most important against which national legislation should be provided next winter.

I have said that I believe Asiatic cholera may be as successfully dealt with in this country as small-pox—notwithstanding that we have no such demonstrated prophylactic for the former, as vaccination is for the latter disease; that it may, probably, be more suc-

cessfully dealt with than yellow fever—notwithstanding that this is limited by climate and temperature, while cholera is independent of the one and only measurably affected by the other. I believe this to be the case as the result of my own official experience. In the last two epidemics of cholera, the disease was controlled wherever it appeared in the localities. under my supervision, by the adoption and enforcement of the simplest measures. Surface wells were fouled with carbolic acid, so that their use for drinking and culinary purposes was necessarily abandoned, and a pure water supply was provided instead. Every house where a case of cholera appeared was promptly taken charge of by the sanitary authorities; the patient was isolated; discharges were disinfected and buried; all other sources of infection were carefully looked after, and the premises, generally, were put in the best attainable sanitary condition; and with marked results upon the extension and progress of the disease. Every community, for itself, may readily provide a similar mode of dealing with a cholera outbreak, should the disease, unfortunately, be introduced.

But something more than this is needed in order to perfect the sanitary defense of the whole country. For this we must have coöperation and concert of action. We must devise a plan whereby the limited and individual powers of communities and States may supplement each other and act harmoniously and efficiently for the common welfare. In the exercise of its police powers—upon which all its sanitary laws and ordinances are founded—the municipality is confined within its own limits, or, for certain purposes, to a short distance beyond. The power of the State is in like manner limited by its own boundary lines.

In the absence of a national health organization, with power to act without reference to State lines and with resources to meet every emergency, the best we can now do is to form an organization of all those clothed with sanitary power and authority, both State and municipal:—an organization which shall give effect to the principle that, in sanitary matters, the interests of one are the interests of all; that we are each our brother's keeper in whatever pertains to the prevention of the introduction and spread of epidemic contagion. Such an organization as the Sanitary Council of the Mississippi Valley, supervising—and if need be maintaining—a system of sanitary surveillance similar to the River and Rail Inspection Service in the Valley, and the Immigration-Inspection Service of the recent small-pox epidemic, will be of great value in a two-fold manner.

It will enable State and municipal authorities to aid each other and to make their rules and regulations substantially uniform, and thereby to secure the coöperation and assistance of transportation companies and other commercial interests, whose business success depend so largely on freedom from unnecessary interruption or conflicting and changing restrictions. It will be of positive sanitary value in the moral pressure exerted on the individual agents of travel and traffic.

Here in the Valley, a great improvement in the sanitary conditions of steamboats, barges and river craft, and, to a minor degree, in the care of railway cars, depots and out-buildings, followed the knowledge that the detention for inspection depended upon the experience of the inspector with regard to the particular boat or line. In the same way the conditions of immigrant travel were sensibly improved by the Immigrant-Inspection service, not only on our railroads, but on the ocean steamers themselves. Its effects were also manifested in the administration of the seaboard quarantines, to which the Service was a direct help in securing a prompter and more general compliance with the quarantine requirements of the different ports.

This latter point is one of supreme importance to the interior. Illinois, for example, is as much interested in maritime quarantines as are communities bordering upon the Atlantic and the Gulf of Mexico. During my own official experience the State has repeatedly suffered from the laches and inefficiency of their administration. Her sanitary interests are protected or endangered through them along the whole line from the mouth of the St. Lawrence to the mouth of the Mississippi, and even to the Rio Grande. Means of communication and intercourse are now so multiplied that time and space—in respect to contagious diseases—are practically annihilated; and the methods which secured protection for the interior twenty years ago are, to a great extent, valueless today. In 1873, for example, there were outbreaks of epidemic cholera at Carthage, Ohio, Kandiyohi county, Minn., and Yankton, Dak., caused by cholera poison packed up in the household effects of emigrants in Holland, Sweden and Russia, respectively; these emigrants sailed from healthy ports, in healthy vessels, and were subjected to the usual sanitary requirements of the period. They passed through New York and all the intermediate territory without injury to the public health. But when their infected goods were unpacked in the interior of the continent they liberated the poison which gave rise to the local outbreaks.

Sooner or later the national government will be compelled not only to assume supervision of exterior quarantines, but to provide for a permanent system of coöperation with State and local governments in the administration of inter-State sanitation, in order, on the one hand, to prevent the introduction of exotic epidemic diseases, and, on the other, to prevent their spread from State to State along the great intra-national highways of travel and commerce. This is a national duty. It is one that the national government only can adequately discharge, and its expense is, equitably, one which should be defrayed from the national treasury.

Such an organization as I suggest will be one agency for securing the assumption of this duty by the general government; and the present emergency offers a favorable time for pressing its consideration. Heretofore, legislation in the interest of public health has been obtained, as a rule, at the tail-end of an epidemic. It has too often been in the nature of a locking of the stable-door after the horse was stolen.

Let us now see if we cannot reverse the process, and, while there is yet time, induce not only Congress, but States and municipalities to take the necessary action for securing a better protection of the public health.

Just now this means more than the good to be found in the saving of human life and in avoiding the suffering and misery, the ruined homes and desolated families which an epidemic always leaves in its track. It means the prevention of panic; it means the prevention of the interruption of trade and commerce; it means the prevention of the loss of millions of dollars, all of which would inevitably result from an epidemic of Asiatic cholera in this country. Already the disease has cost Southern Europe not less than a hundred million dollars—six million dollars up to October 1st in trying to prevent its spread in Italy alone, with a loss of four million dollars even in the month of August, before the disease had effected a serious foot-hold; and now it is announced that the decrease of the national revenues of France has been materially aggravated by the reduction of receipts from railways, caused by the cessation of travel consequent upon the prevalence of the cholera epidemic. And yet Europe is only upon the threshold of this epidemic, if we may judge from the past.

Shall we be warned in time, or shall we wait until the pestilence has landed and obtained a foothold? A single outbreak—possibly a single case—of Asiatic cholera in New York, or Chicago, or St. Louis or New Orleans, in our present condition, would cost the country millions of dollars, even though no epidemic spread should result.[1] With a perfectly feasible quarantine system, whose entire cost would not be a tithe of this sum, the chances of that single case may be made exceedingly remote. With an adequate sanitary organization—embracing within its scope the national authority, the State and the municipal, each in its respective sphere—not one case, nor one hundred could establish an epidemic.

Such an organization of the sanitary defenses would inspire public confidence and prevent panic in the face of real danger—and panic is one of the worst complications of a cholera epidemic, as fear is one of the most potent predisposing causes of the disease.

Our duty, our responsibility, and our opportunity, seem to me plain and obvious. So far as pushing general and local sanitation go, I believe we are doing fairly well; and to this extent we are reducing the chances of the spread of cholera, should it effect a landing through defective or wanting quarantine provisions. The next work that lies close to our hands is to inform the public as to the necessity of securing adequate legislation—national, State and municipal.

Congress must be urged to reorganize and rehabilitate the National Board of Health, or to provide an efficient substitute—one clothed with increased power and supplied with ample funds to maintain an effective system of modern sanitary quarantine for the exterior; to maintain an interior sanitary inspection service for the great highways of travel by land and water; and to give judicious coöperation and substantial assistance to States and municipalities in preventing the introduction of epidemic diseases into one State from another, and in preventing their spread within the States themselves.

Congress should give the President the power to issue a proclamation, upon the recommendation of the national health authority, forbidding immigration into the United States from infected districts of other countries, and it should provide some method of international sanitary coöperation between this country and the Dominion of Canada, whose interests are substantially the same as ours in these matters, and whose contiguity makes coöperation of vital importance.

In States which now have no boards of health, or whose boards are not vested with the necessary authority or provided with adequate resources, the people should be awakened to the necessities of the situation. Legislators should be thoroughly informed as to the facts, and urged to provide suitable legislation.

Information on sanitary matters should be widely diffused to this end, and also to the end that, if an epidemic should come, we may not have to encounter the obstacles which ignorance is always ready to put in the way of what it does not understand. Happily, in this country we are not likely to meet with the treatment that the superstitious peasantry of France and Italy have accorded their physicians and health officers. But sanitary education and knowledge cannot be too widely spread.

These are matters which may profitably occupy much of our time and attention for the next two months; and I would suggest that when this meeting of the Conference adjourn it be to meet again in Washington early in December, for the purpose of conferring with the President, the proper Cabinet officers and the committees of the Senate and House as to the legislation which should be asked for at the next session of Congress. To this meeting I think not only should representatives of State Boards of Health be invited, but also all quarantine officers and the health authorities of the large cities, as well as those of the Dominion of Canada. I would also suggest that quarantine officers and those who are responsible for the local sanitation of towns, cities and States should be requested to come prepared to give all necessary information concerning the quarantine and sanitary affairs of their respective ports and localities.

[1] In 1879 the report of a single case of yellow fever in the South caused a shrinkage in the provision market, in Chicago alone, which amounted to a million of dollars within twenty-four hours.

FOREIGN CORRESPONDENCE.

PARIS LETTER.

PARIS, October 17, 1884.

Dr. Magnan, physician to the "Hospice Sainte Anne" (asylum for lunatics), lately delivered a very interesting clinical lecture on the various forms or

which he endeavored to show that anti-vivisectionists belonged to this interesting class of lunatics. He stated that the too ardent zeal displayed by anti-vivisectionists was a proof that their brains were weak and not properly balanced, that being of nervous temperaments, their conceptions, however just they may seem, are yet simply the precursory manifestations of incipient monomania. We have hitherto observed the insanity of financiers, speculators, and inventors, which consists of extravagant ideas of grandeur, of possessing large fortunes which did not in reality belong to them. In alcoholic subjects it is the delirium of persecution, whereas in anti-vivisectionists the monomania is quite of a different character, and may be considered a new type, as it is only within the last ten or fifteen years that it has been noticed, that is, since the question of vivisection was first agitated and protested against by would-be philanthropists. Dr. Magnan also brought the subject before the Biological Society of Paris, when he produced several examples of this new form of monomania, and among others he related the case of a lady of mature age whose solicitude for animals was such that whenever it rained she wept, because she was afraid of the animals out of doors getting wet. This morbid sensitiveness becomes exaggerated whenever she reads the reports of the anti-vivisectionists, when she gives herself up to the most delirious and eccentric acts. In the streets she is seen picking up pieces of broken glass lest they should hurt the horses' feet; she was also seen taking up her post at cab-stands with the view of preventing a horse that was feeding being disturbed. One morning, passing before a coal shop, this lady noticed that while the coal-man was harnessing his horse he illtreated the animal, and begged of the man to let her do it herself. She then embraced the horse, fastened it to the shafts of the cart and let the man start on his business with the injunction that the horse should be no more maltreated, enquiring at the same time at what hour the animal was in the habit of getting its food. The next day she was seen at the shop at the hour mentioned, and went to the place at the same time for several days after. She would take up the ugliest and dirtiest dogs that she would find in the streets and carry them to her house, which was a regular menagerie. Dr. Magnan related the case of another woman who was a vegetarian, and whose eccentricity consisted in living exclusively on vegetables because, she said, every one who ate meat was guilty of murder, and she would go to the slaughter-houses and remonstrate with the butchers on their cruelty. This woman's weakness also consisted in bringing together stray animals in the streets, such as dogs, cats, etc., and feeding them with bread from a basket she carried about for the purpose.

Sciatica is certainly one of the most intractable diseases a medical man has to deal with, and after having tried the usual remedies both general and local with unsatisfactory results, Dr. Debove, a hospital physician, adopted the local application of intense cold which he produced with methyl-chloride, and with manifestations of monomania, or what is more properly termed "affective or impulsive insanity," in which he obtained as low a temperature as 23° C., or 9.4° F. below freezing point. A spray of the fluid is directed to the whole of the painful region, and the skin becomes hard and pale. After a short time the tissues are allowed to thaw, and it is then often found that the pain has disappeared. Bullæ sometimes form on the skin as a consequence of the freezing, but they are of no importance, and the operation may be repeated if necessary. Dr. Debove states that he has had only a few relapses among the patients so treated.

The insolubility of the biniodide of mercury is well known, one litre of water dissolving only 4 centigrammes of the salt at the ordinary surrounding temperature, and at a slightly raised temperature it dissolves 5 centigrammes. M. Bourgoin has found that by adding alcohol to the water in the proportion of one-tenth it would dissolve 8 centigrammes of the biniodide salt. In pure alcohol, that is in rectified spirits, 2 grammes 90 centigrammes of the salt per litre can be dissolved. A litre of absolute alcohol would dissolve 11 grammes 86 centigrammes of the biniodide of mercury, which is of some advantage to know, as the salt is frequently not prescribed owing to its feeble solubility.

The winter session of the Paris School of Medicine will begin on the 3rd of November, and the following is a list of the professors who are to officiate during the session:

Prof. Gavarret, on Medical Physics.
Prof. Peter, on Medical Physiology.
Prof. Sappey, on Anatomy.
Prof. Gautier, on Medical Chemistry.
Prof. Lannelongue, on Surgical Pathology.
Prof. Robin, on Histology.
Prof. Cornil, on Morbid Anatomy.
Prof. Laboulbène, on History of Medicine and of Surgery.
Prof. Brouardel, on Medical Jurisprudence.

CLINIQUES.

Prof. Germain Sée, Clinical Medicine, at the Hotel-Dieu.
Prof. Hardy, Clinical Medicine at the Hopital de la Charité.
Prof. Potain, Clinical Medicine at the Hopital Necker.
Prof. Jaccoud, Clinical Medicine at La Pitié.
Prof. Ball, Mental Pathology at the Sainte-Anne Asylum.
Deputy-Prof. Joffroy, Diseases of Children.
Prof. Fournier, Syphilitic and Cutaneous Affections at the Hospital Saint-Louis.
Prof. Charcot, Diseases of the Nervous System at the Salpétriére Asylum.
Prof. Richet, Clinical Surgery at the Hotel-Dieu.
Prof. Verneuil, Clinical Surgery at La Pitié.
Prof. Trélat, Clinical Surgery at La Charité.
Prof. Le Fort, Clinical Surgery at the Hopital Necker.
Prof. Panas, Ophthalmology at the Hotel-Dieu.
Prof. Pajot, Clinical Obstetrics.

A. B.

MISCELLANEOUS.

SANITARY CONVENTION AT EAST SAGINAW, MICH.,

Under the Auspices of the State Board of Health, Arrangements having been made by a Local Committee of Citizens of East Saginaw, acting with a Committee of the State Board of Health.

TIME AND PLACE.—You are cordially invited to be present at the sessions of a Sanitary Convention which will be held in East Saginaw, Mich., on Tuesday and Wednesday, December 2 and 3, 1884.

SESSIONS.—There will be sessions the first day at 2 P. M. and 7:30 P. M.; on the second day at 9 A. M., 2 P. M., and 7:30 P. M., standard time.

At each session of the Convention there will be addresses or papers on subjects of general interest pertaining to public health, each paper to be followed by a discussion of the subject treated.

OFFICERS OF THE CONVENTION.—President, Hon. Wm. L. Webber; Vice-Presidents, Hon. David H. Jerome, Saginaw City; Rev. Rowland Connor, East Saginaw; Hon. Benton Hanchett, Saginaw City; Dr. H. C. Potter, East Saginaw; Hon. N. B. Bradley, Bay City; Hon. John S. Estabrook, East Saginaw; Hon. John Moore, Saginaw City; Hon. John B. Atwood, Flint; B. B. Ross, M.D., East Saginaw; Hon. J. J. Wheeler, East Saginaw; John Barter, Esq., East Saginaw. Secretary, Dr. H. V. Brooks; Assistant Secretary, ——— ———

ADMISSION.—The admission to all sessions of this Convention will be free, and the public are cordially invited. The invitation is especially extended to health officers to be present and take part in the discussions.

OBJECTS OF THE CONVENTION.—The objects of the Convention are the presentation of facts, the comparison of views, and the discussion of methods relating to the prevention of sickness and deaths, and the improvement of the conditions of living.

ADDRESSES AND SUBJECTS TO BE PRESENTED AND DISCUSSED.—Welcoming Address by Hon. John S. Estabrook, Mayor of East Saginaw; an address by the President of the Convention, Hon. William L. Webber.

Among the subjects which it is expected will be presented and discussed are the following:

1. The present and future water supply of East Saginaw.
2. Drainage and sewerage of East Saginaw.
3. The disposal of waste matter.
4. Coöperation of citizens in preventing the spread of diseases.
5. The sanitary condition and needs of school buildings and grounds.
6. The teaching of physiology and of the effects of alcohol, etc., in the public schools.
7. Ventilation.
8. The preparation of food.
9. The adulteration of food.
10. Public health laws.

The papers are expected to be original contributions, which when read are to be considered the property of the Convention, and to be left with the Secretary. Programmes will be issued before the Convention.

It is expected that reduced fare on railroads may be obtained by applying to the Secretary of the Convention for certificates.

For further information address,

HARRIET V. BROOKS, M.D.,
Secretary.
934 Genesee Avenue, East Saginaw, Mich.

OFFICIAL LIST OF CHANGES IN THE STATIONS AND DUTIES OF OFFICERS SERVING IN THE MEDICAL DEPARTMENT UNITED STATES ARMY, FROM OCTOBER 25, 1884, TO OCTOBER 31, 1884.

Alden, Chas. H., Major and Surgeon, relieved from duty at Ft. Yates, D. T., and ordered for duty at Ft. Snelling, Minn. (S. O. 125, Dept. Dak., Oct. 20, 1884.)

Alden, C. H., Major and Surgeon, in addition to his duties at Ft Snelling, Minn., to perform the duty of attending surgeon at Dept. Headqr's. (S. O. 127, Hdqr's Dept. Dak., Oct. 23, 1884.)

Wilson, W. J., Captain and Assistant-Surgeon, assigned to temporary duty at Fort Trumbull, Conn. (S. O. 220, Dept. East, Oct. 27, 1884.)

Corbusier, W. H., Captain and Assistant-Surgeon, assigned to duty at Fort Bowie, A.T. (S. O. 99, Dept. Ariz., Oct. 22, 1884.)

La Garde, L. A., Captain and Assistant-Surgeon, assigned to duty at Fort Ellis, M. T., relieving First Lieutenant G. E. Bushnell, Assistant-Surgeon U. S. A., who upon being relieved, will report for duty at Ft. Snelling, Minn. (S. O. 126, Dept. Dak., Oct. 22, 1884).

Everts, Edward, First Lieutenant and Assistant-Surgeon, leave of absence extended one month. (S. O. 107, Hdqr's Div. Pacific, Oct. 21, 1884.)

McCaw, Walter D., First-Lieutenant and Assistant-Surgeon, ordered from Ft Craig, N M., to Ft. Wingate, N. M., for duty. (S. O. 92, Hdqr's Dist. of New Mexico, Oct. 21, 1884).

OFFICIAL LIST OF CHANGES IN MEDICAL CORPS OF THE NAVY DURING THE WEEK ENDING NOVEMBER 1, 1884.

Beardsley, Grove S., Surgeon, to Washington, D. C., for examination preliminary to promotion and as to qualifications for sea duty, Oct. 31, 1884.

Craig, Thomas C., Passed Assistant-Surgeon, to the "Alliance" for temporary duty, Oct. 31, 1884.

Gardner, James E., Passed Assistant-Surgeon, to the Naval Hospital, Norfolk, Va., Oct. 28, 1884.

Hall, John H., Passed Assistant-Surgeon, from the Naval Hospital, New York, to the Navy Yard, Mare Island, Cal., Oct. 29, 1884.

Hord, William T., Medical Director, to continue duty as member of the Retiring Board, until Jan. 1, 1884, Oct. 27, 1884.

Lovering, P. A., Passed Assistant-Surgeon, to the Naval Dispensary, Washington, D. C., for temporary duty, Oct. 27, 1884.

Turner, Thomas J., Medical Director, to continue duty as member of the Retiring Board until Jan. 1, 1884, Oct. 27, 1884.

Steele, John M., Passed Assistant-Surgeon, to the Naval Hospital, New York, Oct 29, 1884.